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Sierra 415A-4

PCM SPAN AND REPEATER TEST SET

MAINTENANCE MANUAL

B025415A4A

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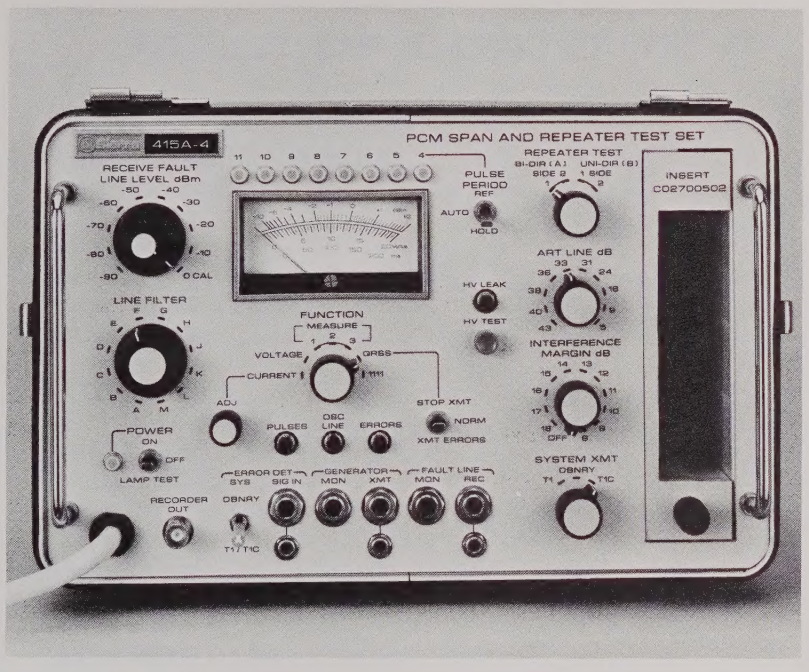

LSI/Sierra 415A-4 PCM Span and Repeater Test Set

This Maintenance Manual provides information for service and calibration center use. It is suggested that the instrument be calibrated on an annual basis, depending upon conditions and user requirements.

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1. FUNCTIONAL DESCRIPTION

1.01 The 415A-4 consists of a pattern generator, counter logic control, receiver, error detector, repeater tester, and power supply.

PATTERN GENERATOR

1.02 The pattern generator provides MEAS 1, MEAS 2 and MEAS 3, Quasi-Random Word, and "All Ones" signals. It includes various clock oscillators, pulse power output stage, and certain logic controls.

1.03 Crystal-controlled Clock Oscillators set the basic transmission speed of all generated test patterns. They are controlled by the SYSTEM XMT switch. Three bit rates may be selected by this switch: 1.544 Mb/s (T1), 3.152 Mb/s duobinary, and 3.152 Mb/s (T1C). The clock circuit generates a succession of precisely divided "time slots" into the Pattern Generator and its associated format determining input circuits.

1.04 The standard Quasi-Random Word (QRW) is connected to the Pattern Generator when the FUNCTION switch is positioned to QRSS (Quasi-Random Signal Source). The QRW is a repetitive sequence of 1,048,575 bits, and is produced, at the selected bit rate, by a 20-bit shift register and associated gate circuits ($2^{20} - 1$ bit count). QRW simulates an active PCM terminal by generating a similar spectrum of energy. The signal is limited to a maximum of 14 zeros in sequence. (Good repeaters can generally tolerate 14 zeros in sequence, i.e., no pulses during 14 time slots, while marginal repeaters may fail because their resonant clock circuits tend to fall out of step during lengthy absence of pulses.)

1.05 When the FUNCTION switch is positioned to MEASURE 1, 2, or 3 the pattern generator is conditioned to produce special groups of bipolar pulses which vary at an audio rate selected by the LINE FILTER switch. When the FUNCTION switch is positioned to "1111" the pattern generator produces all "ones", that is, every time slot will be occupied by a pulse (double bit pulse in duobinary).

1.06 Output of the Pattern Generator drives the Output Amplifier, which produces a line signal of 6V Peak-to-peak (3 V base-to-peak). This pulse amplifier generates a pulse only when commanded by the Pattern Generator. Polarity of the pulse is also determined by the Pattern Generator.

1.07 A sub-function switch associated with the QRSS function can initiate pre-determined coding violations into the Pattern Generator (XMT ERRORS) or turn off the output amplifier to momentarily stop transmission of signals (STOP XMT).

1.08 In the MEASURE 1, 2 and 3 positions the Pattern Generator can be controlled by the Counter/Logic circuit, which determines the density of pulses in the test signals. The PULSE PERIOD switch determines whether density will be lightest (REF position); or allowed to progress periodically toward greater density (AUTO), or to hold at a specific density (HOLD).

RECEIVER

1.09 The Receiver circuit includes input amplifiers and bandpass filters to process the incoming tone signal from the Fault Locating Pair. The RECEIVE FAULT LINE LEVEL control adjusts the gain of the receiver. A section of the LINE FILTER switch selects correct high and low pass filter components to provide a narrow audio bandpass at the desired frequency.

1.10 The received tone is fed into a Correlator which is conditioned to recognize the desired audio tone established by the LINE FILTER control. Output of this synchronous detector is a DC potential which varies according to the level of the received tone. Output of the Correlator drives the Meter. The correlator is essentially a finely tuned tracking bandpass filter (band-width about 20 Hz). It is capable of maintaining the narrow pass band without need for manual tuning circuits.

ERROR DETECTOR

1.11 The error detector includes all error, pulse and oscillating line detecting circuitry. The ***Pulses*** detector recognizes line signals and lights the PULSES lamp.

1.12 The "AMI Errors" Detector is operative in all SYSTEM XMT switch positions. Any violation of the alternate mark inversion rule will light the ERRORS lamp. In DBNRY position the composite duobinary signal is separated into two bipolar pulse trains which are both monitored by the error detector circuit. Error detection is accomplished by sampling the received signal for presence and polarity of pulses, for a period of 40 nsec during each time slot. The sample point and timing is determined by a clock circuit, synchronized to the received pulse train.

1.13 The ***Oscillating Line*** Detector lights the OSC LINE lamp when it detects frequencies less than 100 kHz at the PCM SIG IN jack.

REPEATER TESTER

1.14 The Repeater Tester includes circuits for input/output interface with an inserted repeater. Components of the tester include a signal generator, an interference generator, an artificial line, and repeater voltage, current and insulation resistance test circuits.

1.15 ***Repeater Voltage*** and ***Current*** measurements are straight-forward tests employing the Meter and FUNCTION switch. Repeater current is adjusted to the required value at the beginning of tests.

1.16 The ***Artificial Line*** provides simulated characteristics of a line for testing an inserted repeater. Attenuation is varied by the ART LINE dB switch, from 5 to 43 dB loss (at 772 kHz). When the GEN XMT and PCM SIG IN jacks are unoccupied the Generator signal is fed into the artificial line, and the Error Detector circuits monitor the repeater output.

1.17 ***Interference*** is simulated by a sine wave signal at a frequency close to one-half the bit rate selected by the SYSTEM XMT switch. When interference is increased (clockwise direction of the INTERFERENCE MARGIN switch) the simulated crosstalk energy should eventually cause errors at the repeater output, as indicated by a flashing ERRORS lamp. Designations on the INTERFERENCE MARGIN switch (18 through 8) are generally related to signal-to-noise ratio readings. Switch readings were calibrated on the basis of an "all ones" signal (FUNCTION switch to 1111) and 33 dB attenuation (ART LINE to 33).

1.18 To test ***Insulation Resistance*** the HV TEST pushbutton is depressed to apply 200 VDC between the repeater circuitry and its chassis. If resistance less than 1 Megohm $\pm 25\%$ is encountered the HV LEAK lamp will light.

POWER SUPPLY

1.19 The power supply includes regulated +5 V for logic circuits, +15 V and -15 V for other circuits, and -200 V for repeater insulation resistance testing.

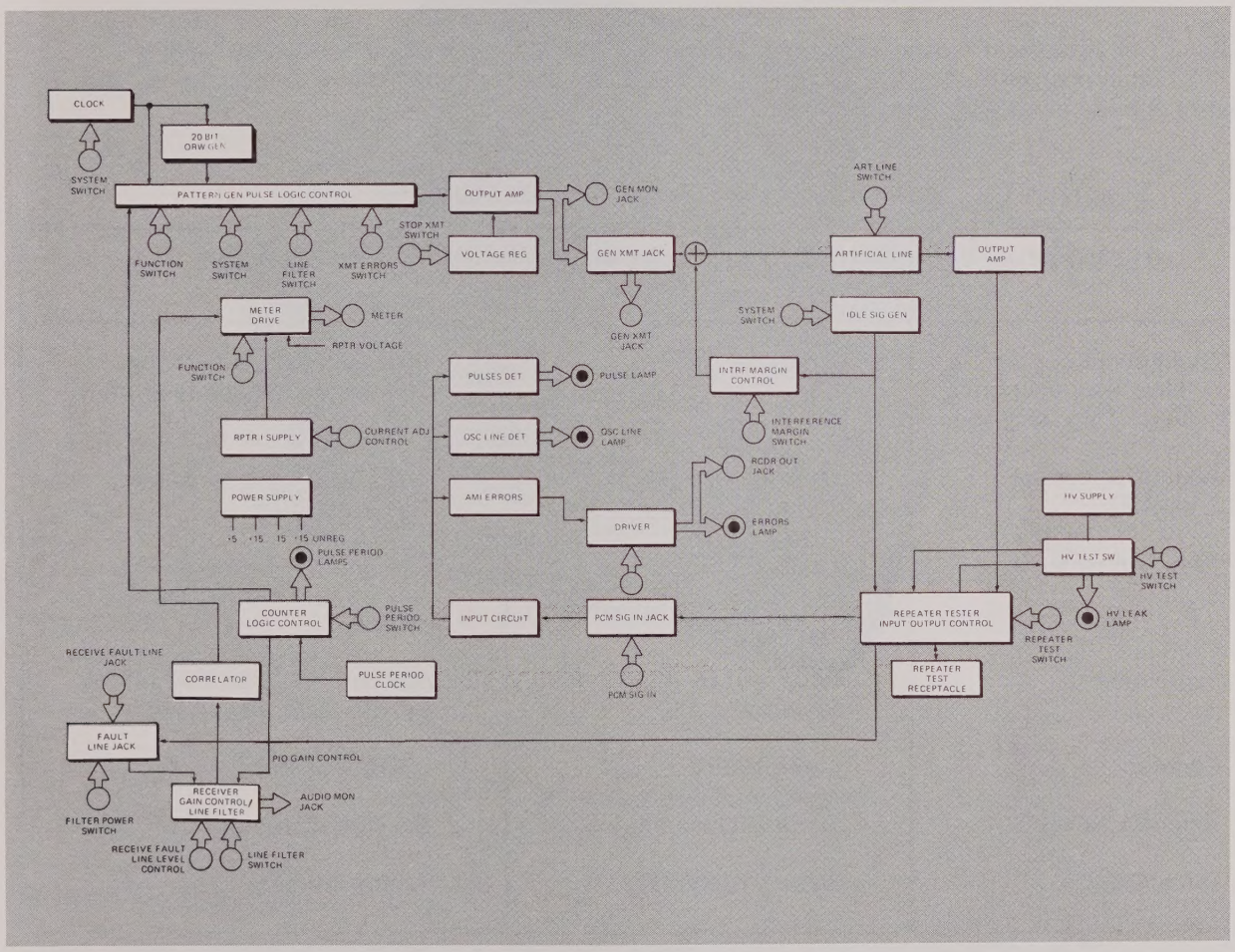


Figure 1-1. Functional Block Diagram

2. CALIBRATION

RECOMMENDED TEST EQUIPMENT

2.01 Test equipment recommended for maintenance of the Sierra 415A-4 is listed in Table 2-1. Equivalent instruments, with characteristics equal to or better than those listed, may be used in lieu of specific models or types recommended.

Table 2-1. Recommended Test Equipment

DESCRIPTION	MODEL OR PART DESIGNATION	COMMENT
Oscilloscope Time Base Plug-In Vert. Amp. Plug-In	Tektronix 7603	Dual trace A + B function, 50 MHz bandwidth or greater, X 10 probes
Digital Multimeter (DMM)	Dana 3300, 4300 or Fluke 8000A	1 Megohm input or greater, 1% accuracy
RMS Voltmeter	Fluke 8920	1 Megohm input or greater, 800 Hz to 3100 Hz, linear dB scale
Synthesizer	Fluke 6011A or Rockland 5100	800 Hz to 4 MHz, 500 mV to 5V, 1% distortion or less
Counter	Fluke 1900A	2 MHz or greater
Extender Board	Sierra D03063400A	See Note Paragraph 2.03, Step 5
Patch Cord	Sierra 916400037	310-to-310 plug

INTERNAL ACCESS

2.02 For access to internal parts of the 415A-4 and to various test points on PCB's, remove the instrument from its metal case as follows: (Figure 2-1 shows PC board and fuse location.)

Step 1: Remove case carrying cover and verify POWER switch is in OFF position.

Step 2: Place test set face down resting firmly on its chromeplated bails.

Step 3: Loosen captive, quarter-turn fasteners at each of four corners on test set's backside.

Step 4: Lift metal case vertically until it clears instrument.

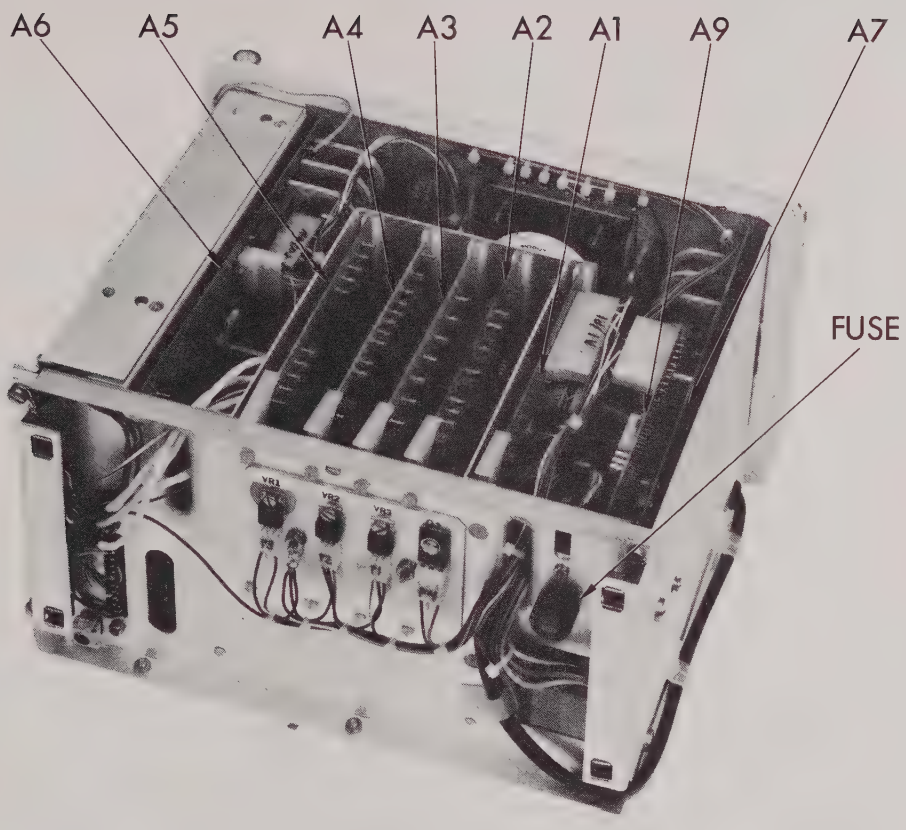


Figure 2-1. PC Board and Fuse Location

POWER SUPPLY

2.03 Before beginning the calibration procedure, permit all test equipment to warm up for a minimum of 30 minutes. Adjust 415A-4 meter to mechanical zero to minimize error in the horizontal and vertical positions.

WARNING

WHEN TEST SET IS REMOVED FROM CASE AND POWERED ON, POTENTIALLY HAZARDOUS VOLTAGES ARE PRESENT: THEREFORE, APPROPRIATE SAFETY PRECAUTIONS MUST BE PRACTICED AT ALL TIMES WHILE WORKING ON OR AROUND EXPOSED CIRCUITS AND CONNECTORS.

Power Supply Regulation

Step 1: Set 415A-4 instrument power toggle switch to POWER ON (UP). Verify POWER lamp is illuminated.

Step 2: Verify 5.0 ± 0.3 VDC at TP3 of A1 PC board.

Step 3: Verify 15 ±0.5 VDC at TP1 of A1 PC board.

Step 4: Verify −15 ±0.5 VDC at TP2 of A1 PC board.

Power Loop Current and Voltage

Step 5: Plug extender board into 415A-4 repeater test receptacle insert.

NOTE: If Extender Board D03063400A is not available, the required resistors or meter can be bridged across the corresponding pins of connector J1 at rear of repeater test well.

Step 6: Connect resistors to repeater extender board (D03063400A) shown in Figure 2-2. Parallel in DMM with 75-ohm resistor.

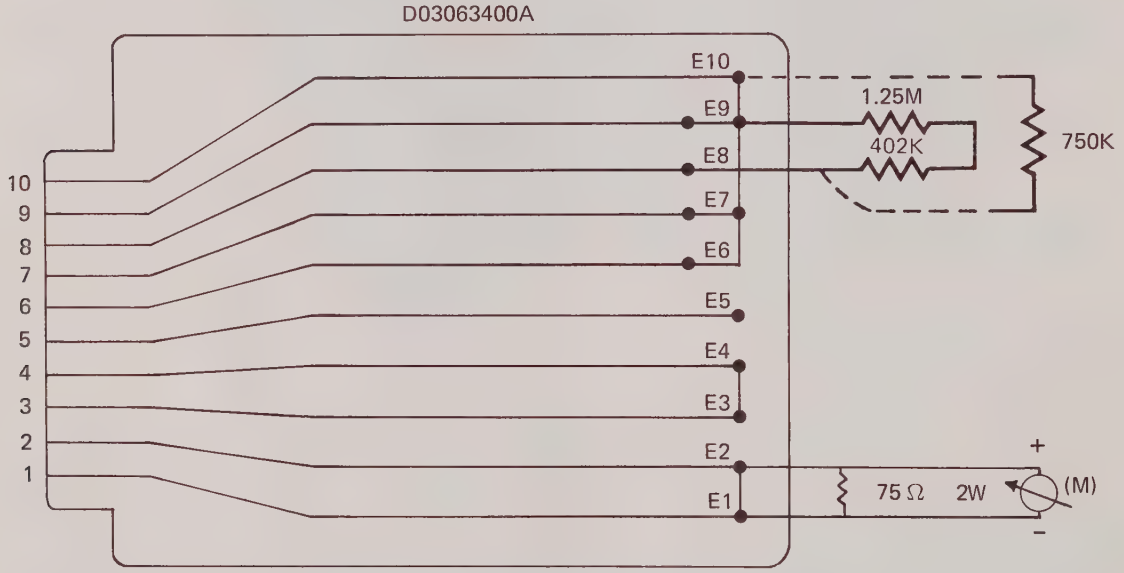


Figure 2-2. Extender Board Configuration

Step 7: Set 415A-4 FUNCTION selector control switch to CURRENT and rotate current ADJ pot 415A-4 front panel for DMM indication of 15.00 VDC.

Step 8: Adjust potentiometer R10 of A1 PC board for indication of 200 mA on 415A-4 meter.

Step 9: Set 415A-4 FUNCTION selector control switch to VOLTAGE, rotate current ADJ pot for DMM indication of 10.50 VDC.

Step 10: Adjust A1R27 for 415A-4 meter indication of 10.5 VDC.

Step 11: Set 415A-4 selector control switch to CURRENT and vary ADJ pot until 415A-4 meter current range span of 20 ma through 200 ma is confirmed.

High Voltage Leak

Step 12: Connect DMM to terminals E8-GND and E10. (See Figure 2–2.)

Step 13: Press REPEATER TEST/HV TEST push button switch on 415A-4 and read digital voltmeter (CAUTION, HIGH VOLTAGE). Verify that voltage reading is within ±10% of 200 volts. Verify that the 415A-4 HV LEAK lamp remains extinguished.

Step 14: Turn OFF 415A-4 and connect 750K resistor across pins E8 and E10 in parallel with the existing resistors.

Step 15: Turn ON 415A-4 and press REPEATER TEST/HV push button switch. Verify that HV LEAK lamp illuminates.

TRANSMITTER

2.04 Transmitter tests include the generator, artificial line length simulator calibration and interference margin prescribed in subsequent paragraphs.

Generator

2.05 Test the generator as follows:

Step 1: Set appropriate 415A-4 selector control or toggle switch as described in (a) through (d).

a. PULSE PERIOD to REF
b. FUNCTION to 1111
c. STOP XMT/NORM/XMT ERRORS to NORM
d. SYSTEM XMT to T1

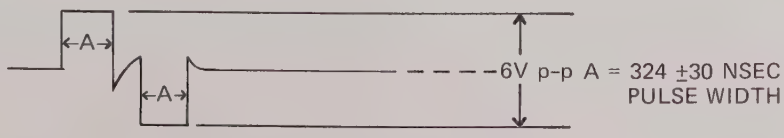
Step 2: Connect 310 plug with 100-ohm, 1% resistor across Tip and Ring to GEN XMT jack.

Step 3: Connect oscilloscope probes across 100-ohm resistor with both probe ground leads connected to chassis ground.

Step 4: Set oscilloscope controls as listed in (a) through (e).

a. SYNC to INTERNAL
b. MODE to A + B (Added)
c. CHAN B to INVERTED
d. SENSITIVITY to 0.1 v/cm (x 10 probes) (CH A & B)
e. SENSITIVITY to 1 v/cm (x 1 probes) (CH A & B)

Step 5: Verify that bipolar pulse pattern is present and is 6.0 ±0.5 V p-p. If not, adjust R46 on A4 PC board for 6.0 V p-p.



Step 6: Set 415A-4 SYSTEM XMT selector control switch to DBNRY and Verify 6.0 V p-p bipolar pulse pattern with pulse width of 636 ±30 nanoseconds on Scope.

Step 7: Set 415A-4 SYSTEM XMT selector control switch to T1C and Verify 6.0 V p-p bipolar pulse pattern with pulse width of 160 ±25 nanoseconds on Scope.

Step 8: Set 415A-4 FUNCTION selector control switch to MEASURE 1 and SYSTEM XMT selector control switch to T1. Verify that a series of pulse TRIOS are present. (Refer to Figure 2-3.)

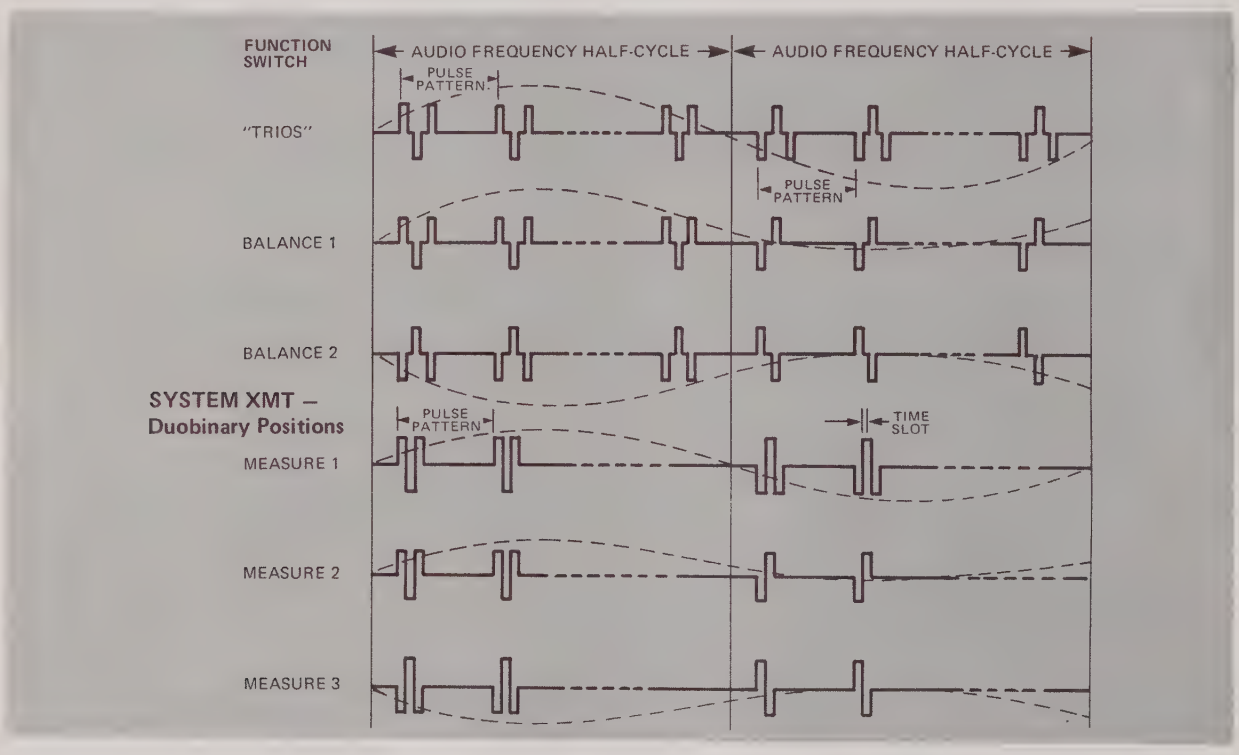


Figure 2-3. Transmitter Pulse Pattern

Step 9: Set PULSE PERIOD toggle switch to AUTO and Verify pulse TRIOS increase in density by 648 nanoseconds for each pulse period. Return PULSE PERIOD toggle switch to REF and remove 310 plug from GEN XMT jack.

Artificial Line

2.06 Perform the artificial line length simulator calibration as follows:

Step 1: Disconnect all resistors from Figure 2-2 extender board (D03063400); connect 100-ohm resistor across E3 and E4 of extender board; connect HP3400A RMS voltmeter across 100-ohm resistor, E3 (GND) and E4 (Signal).

Step 2: Set appropriate 415A-4 selector control or toggle switch as described in (a) through (f).

a. PULSE PERIOD to REF
b. FUNCTION to 1111
c. REPEATER TEST to BI-DIR SIDE 1
d. INTERFERENCE MARGIN dB to OFF
e. ART LINE to 5
f. SYSTEM XMT to T1

Step 3: Verify that RMS voltmeter levels conform to values shown in Table 2-2 for corresponding art line settings. For optimum compromise of tabulated values, adjust potentiometer R124 on A6 PC board as required.

Table 2-2. Art Line Code

ART LINE SETTING	RMS VOLTMETER LEVEL
5	+2.8 ±0.5 dB
9	-1.2 ±0.5 dB
16	-8.2 ±0.5 dB
24	-16.2 ±0.5 dB
31	-23.2 ±0.5 dB
33	-25.2 ±0.5 dB
36	-28.2 ±0.5 dB
38	-30.2 ±0.5 dB
40	-32.2 ±0.5 dB
43	-35.2 ±0.5 dB

Interference Margin

2.07 To test the interference margin, proceed as follows:

Step 1: Set 415A-4 ART LINE selector control switch to 24 and note exact reading in dB on voltmeter.

Step 2: Set 415A-4 SYSTEM XMT selector control switch to DBNRY and note exact reading in dB on voltmeter.

Step 3: Set 415A-4 SYSTEM XMT selector control switch to T1C and note exact reading in dB on voltmeter.

Step 4: Set 415A-4 SYSTEM XMT selector control switch to T1 and set INTERFERENCE MARGIN selector control switch to 10.

Step 5: Disconnect generator signal from ART LINE simulator by connecting 310 plug to GEN XMT jack.

Step 6: Verify that voltmeter level reading is 10 dB below exact reading as noted in Step 1. If required, adjust potentiometer R98 on PC board A6. (For instance, if exact value is -16.2, then -10 dB of exact value will be -26.2 dB.)

Step 7: Set 415A-4 SYSTEM XMT selector control switch to DBNRY and verify that voltmeter level reading is 19 dB below exact reading noted in Step 2. If required, adjust potentiometer R99 on A6 PC board.

Step 8: Set 415A-4 SYSTEM XMT selector control switch to T1C and verify that voltmeter level reading is 12 dB below exact reading noted in Step 3. If required, adjust potentiometer R100 on PC board A6.

Step 9: Set 415A-4 INTERFERENCE MARGIN selector control switch to OFF.

Idle Signal Verification

2.08 Idle signal verification is accomplished as follows:

Step 1: Disconnect 310 plug from GENERATOR XMT jack and set 415A-4 FUNCTION selector switch to QRSS. (ART LINE dB remains at 24.)

Step 2: Set 415A-4 REPEATER TEST selector switch to BI-DIR SIDE 2, and SYSTEM XMT selector switch to T1.

Step 3: Note exact RMS meter dB; change REPEATER TEST selector switch to BI-DIR SIDE 1. (RMS meter value should be within tolerance of plus or minus 1 dB.)

Step 4: Repeat Step 3 with SYSTEM XMT selector switch set to DBNRY (tolerance ±1 dB) and subsequently set to T1C (tolerance ±1 dB).

Step 5: Remove extender PC board from 415A-4 repeater well.

RECEIVER

2.09 The receiver tests consist of verifying line filter frequencies and making correlator adjustments.

Line Filter Frequencies

2.10 Line filter frequencies are verified as follows:

Step 1: Connect frequency counter to 415A-4 between TP1 of A2 PC board and GND.

Step 2: Verify that each line filter frequency listed in Table 2-3 corresponds to appropriate LINE FILTER switch setting. Adjust R137 on A7 PCB as required, so all frequencies are within specified tolerances. (R137 is located on bottom side of unit near front panel.)

Table 2-3. Setting and Frequency

LINE FILTER SETTING	LINE FILTER FREQUENCY
A	832 ±17 Hz
B	928 ±19 Hz
C	1048 ±21 Hz
D	1206 ±24 Hz
E	1340 ±27 Hz
F	1508 ±30 Hz
G	1722 ±34 Hz
H	2008 ±40 Hz
J	2193 ±44 Hz
K	2413 ±48 Hz
L	2680 ±54 Hz
M	3017 ±60 Hz

Correlator

2.11 Correlator adjustments are made as follows:

Step 1: Connect frequency synthesizer via electrolytic 15-microfarad 20 Volt (approximate) capacitor to 415A-4 TP2 of A2 PCB. Set frequency synthesizer to 1 kHz and +20 dB.

Step 2: Connect oscilloscope to 415A-4 via TP3 of A2 PCB. Adjust R11 of A2 PCB until waveform on scope is exactly uniform in peak-to-peak amplitude (positive and negative symmetry).

Step 3: After moving synthesizer connection (via decoupling cap) to TP5 and oscilloscope connection to TP6 of A2 PC board, repeat Steps 1 and 2. Adjust R35 on A2 PCB for same waveform uniformity prescribed in Step 2.

Step 4: Disconnect synthesizer and oscilloscope from 415A-4. Connect digital multimeter (DMM) to 415A-4 between TP7 and positive end of C10 on A2 PCB. Adjust R19 on A2 PCB for 0 ±0.002 VDC. Disconnect DMM from 415A-4.

Step 5: Set appropriate 415A-4 selector control or toggle switch as described in (a) through (e).

a. RECEIVE FAULT LINE LEVEL dBm to 0 CAL
b. ADJ Vernier control fully clockwise
c. LINE FILTER to C
d. PULSE PERIOD to REF
e. FUNCTION to MEASURE 1

Step 6: Monitor frequency at TP1 of A2 PCB on counter.

Step 7: Connect frequency synthesizer to FAULT LINE REC jack using RMS voltmeter to monitor input level.

Step 8: Adjust synthesizer for same frequency indicated on counter. Adjust synthesizer input level for 948 mv as indicated on voltmeter.

Step 9: Verify that 415A-4 meter indicates 0 dB. Adjust R23 potentiometer on PC board A2 as required for 0 dB indication.

Step 10: If 415A-4 meter indicates drift in excess of ±0.2 dB, alternately adjust R15 and R39 on PCB A2, as required, to minimize drift. Readjust R23, as required, for 415A-4 0 dB meter indication.

NOTE: It may be necessary to slightly adjust the synthesizer frequency to obtain the desired drift "beat" frequency and median level 415A-4 meter "peaking" indications. Once "peaking" is established, the adjustment should be within a nominal variation of ±1 Hz.

Step 11: Disconnect all test equipment from 415A-4.

ERROR DETECTOR

2.12 Error detector tests include the oscillating line, high level drive, and low level drive performed as follows:

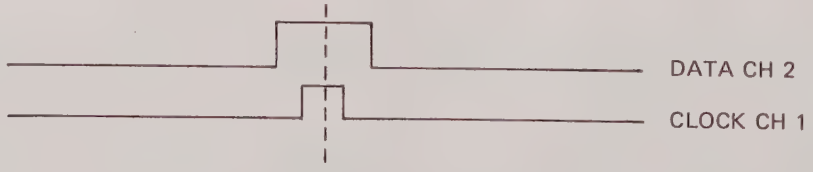
Synchronization of Data and Clock Pulses

Step 1: Connect 310 to 310 cable between generator monitor and PCM signal in jacks.

Step 2: Connect channel 1 of oscilloscope to TP7 of 415A-4 PC board A3 and oscilloscope channel 2 to TP9 of 415A-4 PC board A3; synchronize oscilloscope to channel 2.

Step 3: Set 415A-4 SYSTEM XMT selector switch to T1, and ERROR DET SYS selector switch to T1/T1C. Set FUNCTION selector switch to 1111.

Step 4: Adjust capacitor C12 of 415A-4 PC board A3 so clock (CH 1) is centered within data (CH 2).



Step 5: Readjust, as required, to obtain following results:

a. OSC LINE indicator lamp should remain extinguished for all systems.
b. PULSES indicator lamp should illuminate for all systems.
c. ERRORS indicator lamp remains extinguished unless STOP XMT/NORM/XMT ERRORS toggle switch is set to XMT ERRORS.

Oscillating Line

Step 6: Connect frequency synthesizer to PCM SIG IN jack and monitor input level with one channel of oscilloscope.

Step 7: Adjust frequency synthesizer for 50 kHz at 3.5 V p-p. Verify that 415A-4 OSC LINE indicator lamp illuminates.

High Level Drive

Step 8: Adjust frequency synthesizer for 772 kHz at 8.0 V p-p.

Step 9: Verify that 415A-4 PULSES indicator lamp is illuminated while OSC LINE and ERRORS indicator lamps remain extinguished.

Low Level Drive

Step 10: Adjust frequency synthesizer for 772 kHz at 2.0 V p-p.

Step 11: Verify that PULSES indicator lamp is illuminated while OSC and ERRORS indicator lamps remain extinguished.

CALIBRATION VERIFICATION

2.13 To insure that the test set is working correctly, you may wish to perform this optional operational test. Signals are patched from the pulse generator output (GEN MON) to the receiver input (PCM SIG IN). It is suggested that this test be performed periodically. If results deviate significantly from anticipated results, servicing may be necessary.

Operational Test		
Initial Set-Up		
Step	**Procedure**	**Result**
1	Connect Power cord.	
2	Momentarily depress POWER switch to LAMP TEST position.	All front panel lamps light.
3	Set POWER switch to ON.	POWER lamp lights.
4	Set SYSTEM XMT to T1.	
5	Set LINE FILTER switch to A.	

Operational Test (continued)		
Fault Line Input Check		
Step	**Procedure**	**Result**
6	Patch the GEN MON jack to the FAULT LINE REC jack.	
7	Set the PULSE PERIOD switch to REF.	Lamp 11 lights.
8	Set the FUNCTION switch to MEASURE 1.	
9	Adjust the RECEIVE FAULT LINE LEVEL control for a meter reading of 0 dB. (Use the vernier control for fine adjustment.)	
10	Set the FUNCTION switch to MEASURE 2 position.	Meter should indicate between −5 and −7 dB.
11	Set the FUNCTION switch to the MEASURE 3 position.	Meter should indicate within 1 dB of Step 10.
12	Reset the FUNCTION switch to the MEASURE 1 position.	Meter indicates 0 dB.
13	Switch PULSE PERIOD switch to AUTO.	PULSE PERIOD lamps light in sequence 11 through 4. Meter reading may rise up to 2.5 dB through the range.
14	Set PULSE PERIOD toggle switch to REF.	PULSE PERIOD lamp 11 will light.
15	Rotate the LINE FILTER switch through all the settings, then return to A.	Meter reading should increase approximately 1.3 dB per step.
PCM Signal Input Check		
Step	**Procedure**	**Result**
16	Transfer the patch cord from FAULT LINE REC to PCM SIG IN jack.	
17	Set ERROR DET SYS toggle switch to appropriate system to be tested (T1/T1C or DBNRY).	
18	Set SYSTEM XMT switch to appropriate system to be tested.	
19	Rotate the FUNCTION switch through MEASURE 1, 2 and 3 positions.	PULSES and ERRORS lamps light.
20	Set FUNCTION switch to QRSS and toggle switch to NORM.	PULSES lamp ON; ERRORS lamp off.
21	Set toggle switch to XMT ERRORS.	ERRORS lamp lights.
22	Set toggle switch to STOP XMT.	PULSES and ERRORS lamps go out.
23	Reset toggle switch to NORM.	

Operational Test (continued)		
System Mb/s Check		
Step	**Procedure**	**Result**
24	Repeat steps 6 through 23 for other SYSTEM XMT positions, i.e., DBNRY and T1C. NOTE: It is not possible to verify the operation of the REPEATER TEST, ART LINE, and INTERFACE MARGIN functions with these initial tests.	

3. TECHNICAL DATA

SPECIFICATIONS

3.01 Specifications are shown in Table 3-1.

Table 3-1. 415A-4 Specifications

PULSE TRANSMITTER			
	T1	**Duobinary**	**T1C**
Bit Rates:	1.544 Mb/s	3.152 Mb/s	3.152 Mb/s
Time Slot:	648 ns	317 ns	317 ns
Duty Cycle:	50%	100%	50%
Pulse Width, Nominal:	324 ns ±30	317 ns ±30	160 ns ±25
Pulse Rise and Fall Time:	80 ns	50 ns	40 ns
Pulse Amplitude: (base-to-peak)	±3 V ±10 %	±3 V ±5%	±3 V ±10%
Pulse Overshoot: (% of amplitude)	10 to 30%	Less than 5%	10 to 30%
Audio Component Frequencies (Hz):	A = 832 B = 928 C = 1048 D = 1206	E = 1340 F = 1508 G = 1722 H = 2008	J = 2193 K = 2413 L = 2680 M = 3017
Audio Component Accuracy:	±2%		
Interference Margin Signal:	Sine wave, level adjustable from 8 to 18 dB below level of all ones signal at repeater input.		
Interference Margin Signal Frequency:	770 kHz	770 kHz	1.570 MHz
FAULT LINE RECEIVER			
Filter Frequencies:	Same as transmitter audio component frequencies		
Input Range:	-90 dBm to 0 dBm		
Input S/N Requirement:	15 dB S/N minimum in a ±10 Hz bandwidth centered on desired fault locating frequency.		
Input Impedance:	900 ohms ±10%		
Level Reading Accuracy:	±1.0 dB at 0 dBm on meter; ±2.0 dB at -10 dBm on meter		
Meter Accuracy:	±3% of full scale		
Common Mode Rejection:	60 dB minimum at 4 kHz		
PCM Signal Input:	±1.0 to ±4.0 V, base-to-peak (2.0 to 8.0 V peak-to-peak)		
High Voltage:	200 ±10% VDC. Lamp ON indicates less than 1 Megohm insulation resistance ±50%.		
Temperature Range:	Operating: 0 to +50°C Storage: -40 to +65°C Maximum Humidity: 95%		
Power:	115/230 VAC ±10%, 47.5 to 66 Hz		
Dimensions, Nominal:	Approximately 8 inches H x 12 inches W x 8 inches D		
Weight	Approximately 20 pounds		

ORDERING INFORMATION

3.02 The basic 415A-4 is mounted in a portable carrying case with a detachable cover. The optional inserts for local testing are shown in Table 3-2 and are ordered separately.

Table 3-2. Inserts and Accessories

INSERT PART NO.	APPLICATION
C02700502	WECo 201/205, ITT, Lenkurt (T1, T1C, Duobinary), Vicom, Wescom
C02979601	WECo 208/209/238/239 and equivalent mini-repeaters made by ITT, Lenkurt, Lynch, Vicom, Wescom
C02699001	ITT, Lenkurt, S-C, Vicom, Wescom 3281
C03147000	WECo T1C (218, 219, 248, 249)
C03146900	WECo 217A (SLC-40)
C02776900	WECo 206/236 and Lynch, Wescom equivalents
C03187700	WECo 220/221/231/250 office repeater
D02986700	Lenkurt office repeater with 48V cord
C03031300	Lenkurt office repeater without 48V cord
C03187800	Lenkurt T1C office repeater
ACCESSORIES P/N	**DESCRIPTION**
921000075	Canvas Carrying Bag
916400037	Patch Cable, 6 ft. (310-to-310 plug)
243A-4	Patch Cable, 6 ft. (310-to-310 Alligator Clips)

4. SCHEMATICS AND PARTS LISTS

4.01 Following is a list of 415A-4 schematic diagrams and parts lists included in this section.

Drawing Number	Description
D03230500	415A-4 Interconnect Diagram (3 sheets)
D03197600	A1 Power Supply and Meter Drive (2 sheets)
D03197700	A2 Correlator
D03230100	A3 Error Detector (2 sheets)
D03230200	A4 Pattern Generator, Pulse Driver (2 sheets)
D03230300	A5 Clock Oscillator, QRSS
D03230400	A6 Board Repeater Tester (2 sheets)
D03198400	A7A Receiver (2 sheets)
D03198500	A8 Mother Board
D03198600	A9 Pulse Period Gain Comp., Lamp Driver
D03221300	Front Panel Assembly
D03221100	Final Assembly

THIS DRAWING AND SPECIFICATIONS SHOWN SHALL NOT BE COPIED OR USED WITHOUT WRITTEN CONSENT OF LEAR SIEGLER, INC., SIERRA ELECTRONIC DIVISION

ZONE	LTR	REVISIONS DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE	12/15/76	M PAULL
	A3	PCO 2000, 2020, 2001		
	B	PRE PRODUCTION RELEASE	9/21/77	
	B1	PCO 2481	4/4/78	
	C	PRODUCTION RELEASE	5/26/78	M Dixon

A1
ASSY A03149101
SCHEM D03197600
P1 — XA1

A2
ASSY A03149300
SCHEM D03197700
P1 — XA2

PART OF A8
MOTHER BOARD
ASSY D03156900
SCHEM D03158500

A3
ASSY A03212400
SCHEM D03230100
P1 — XA3

A4
ASSY A03210800
SCHEM D03230200
P1 — XA4

A5
ASSY A03209300
SCHEM D03230300
P1 — XA5

NOTES - UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER, ASSEMBLY DESIGNATION OR BOTH
2. ALL RESISTANCE VALUES ARE IN OHMS
3. ⟷ DENOTES FRONT PANEL MARKING

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED	BASIC	TWO PLACE	THREE PLACE
	UP TO 6	± .02	±
	6 TO 24	± .03	±
	ABOVE 24	± .06	±
	ANGULAR DIMENSION ±		

FINISH:

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
		APPLICATION	415A-4

Sierra — LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025
CODE IDENT. NO. 54778

INTERCONNECT DIAGRAM 415A-4

DATE 8/6/77
BY
CHECKED
APPR

SIZE	DRAWING NO.	REV.
D	D03230500	C

SCALE — STOCK AS — SHEET 1 OF 3

DWG NO. D03230500

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REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	—	SEE SHEET 1		

PART OF FRONT PANEL
ASSY D03231300

S6 ON / OFF / LAMP TEST — POWER
E1
BLK, WHT, GRN

J10 P10
F1 115V 1/4A 230V 1/4A SLO BLOW
115V / 230V S7

T1 POWER TRANSFORMER ASSY C05181900

P4 J4
RED
WHT/GRN
GRN
NC KEY
BLU/BLK
WHT/BLU
WHT
GRY
ORN
BRN

PART OF A8 — PART OF P3
MOTHER BOARD ASSY D03156900 SCHEM D03198500 J3

W1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 — W1

A7
ASSY A03152300 SCHEM D03198400
J3 1 2 3 4 5 6 7 8 9 10 11 12 13 14
J2 1 2 3 4 5 6

A9
ASSY A03152300 SCHEM D03198400
J2 1 2 3 4 5 6
J1 P1 1 2 3 4 5 6 7 8 9
BRN, WHT, GRY, VIO, BLU

PART OF FRONT PANEL
ASSY D03221300
RED ORN YEL GRN
DS5 DS4 DS7 DS8 DS2 DS3 DS1 DS6
7 8 5 4 10 9 11 6
PULSE PERIOD

J2 PART OF P2 11 12

J1 PART OF P1 3 1
ORN BRN

J1 P1 1 2 3 4 5 6 7 8 9 10
KEY NC NC GRN
WHT/GRY
BLK
BLU
VIO
GRN

J8 4 5 2 3 1
J5 T T/S R/S R SLV

T J4 BRN T/S R/S R SLV
FAULT LINE MON

S2 4 5 6 REF 2 3 AUTO HOLD
PULSE PERIOD
WHT/RED
WHT/BRN

E2
WHT/GRN
YEL
WHT/ORN
RED
BRN
WHT/BRN

A6
P1 J1 3 4 5 6 2 1

S3 5 2 6 3 4 T
NL
HV TEST

J6 4 5 2 3 1
ERROR DET SIG IN (TT)

J1 T T/S R/S R SLV
ERROR DET SIG IN (310)

TP GND
PART OF CHASSIS
E5

W2 1 2 3 4 5 6 7 8 9 10 11 12 13 14 — W2
J3 1 2 3 4 5 6 7 8 9 10 11 12 13 14

ASSY A03218900
SCHEM D03230400

J2 P2 3 9 1 2 4 5 11 10 8 7 6
BLU
BLK WHT BLK WHT BLK WHT BLK WHT WHT/GRN

PART OF CHASSIS
E4
J1 8 9 10 7 6 1 2 4 3 5
R2 10
GRN NC NC BRN RED YEL ORN WHT/GRN
J2 8 6 10 3 4 5 7 11 12 2 1 9
AIP1-5 SHT 2
GRN

QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
					LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

63 FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

Sierra — LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025
CODE IDENT. NO. 54778

INTERCONNECT DIAGRAM
415A-4

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
			415A-4
APPLICATION			

DATE 9/7/77
BY
CHECKED
APPR

SIZE D | DRAWING NO. D03230500 | REV. C
SCALE | STOCK AS | SHEET 2 OF 3

DWG NO. D03230500

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REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	–	SEE SHEET 1		

A8 PART OF

ASSY D03156900
SCHEM D03198500

PART OF J3 P3 — 15 14 13 12 11 10 9 8 7 6 5 4 3 1
WHT/GRN, WHT/YEL, NC, NC, WHT/BRN, BLK, WHT, GRY, VIO, BLU, GRN, YEL, KEY, NC, BRN

PART OF J2 P2 — 15 14 13 10 9 8 7 6 5 4 3 2 1
NC, WHT/YEL, WHT/ORN, BLK, WHT, GRY, VIO, BLU, GRN, YEL, ORN, RED, BRN

PART OF J1 P1 — 15 14 13 12 11 10 9 8 7 6 5 4 2
NC, WHT/YEL, WHT/ORN, WHT/RED, WHT/GRN, BLK, WHT, GRY, VIO, BLU, NC, KEY, NC, NC

E1

R1 25K

RECORDER OUT — J9

SIA FRONT: 2A, 1A, 3A, 4A, CW

SIB REAR: 12, 7, 1, 2, 3, 4, 5, 6

SIB FRONT: 12, 1, 2, 3, 4, 5, 6, 7

FUNCTION

M1

S4: XMT ERRORS / NORMAL / STOP XMT

S5: DBNRY, TI/TIC — ERROR DET SYS

PART OF FRONT PANEL
ASSY D03231300

J7: 4, 5, 2, 3, 1 — GENERATOR XMT (TT)

J3: T, T/S, R/S, R, SLV — GENERATOR XMT (310)

J2: T, TS, RS, R, SLV — GENERATOR MON

POWER — DS13
PULSES — DS12
OSC LINE — DS11
ERRORS — DS10
HV LEAK — DS9

PART OF
A1

ASSY A03149101
SCHEM D03197600

J1 P1
12 WHT/RED
1 BRN
5 GRN
10 BLK
3 ORN
6 KEY — NC
4 NC
11 WHT/BRN
2 RED
7 VIO
9 WHT
8 GRY

J2-6 SHT 1

TRANSISTOR ASSY
ASSY C03160700

E3

P1: 1 IN, 2 GND, 3 OUT — VR3
P2: 1 IN, 2 GND, 3 OUT — VR2
P3: 1 GND, 2 IN, 3 OUT — VR1
P4: 1 E, 2 C, 3 B — Q1

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

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DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

Sierra — LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025

CODE IDENT. NO. 54778

INTERCONNECT DIAGRAM
415A-4

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
			415A-4

APPLICATION

DATE 9/9/77 BY CHECKED APPR 9/9/77

SIZE D — DRAWING NO. D03230500 — REV. C

SCALE — STOCK AS — SHEET 3 OF 3

DWG. NO. D03230500

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ZONE	LTR	REVISIONS DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE	4-23-76	PAULL
	A1	PCO UPDATE 1268	4-25-76	B. CARLSON
	A3	PCO 1350, 1445 RAM	8-17-76	MLD
	A4	PCO 1612	8-24-76	MLD
	A6	PCO 1877, 1897		
	B	PREPRODUCTION RELEASE	4/6/77	
		PRODUCTION RELEASE	6-7-77	
	B_1	ECO 16839 D.B.	2/20/77	
	C	ECO 17059	1/14/77	

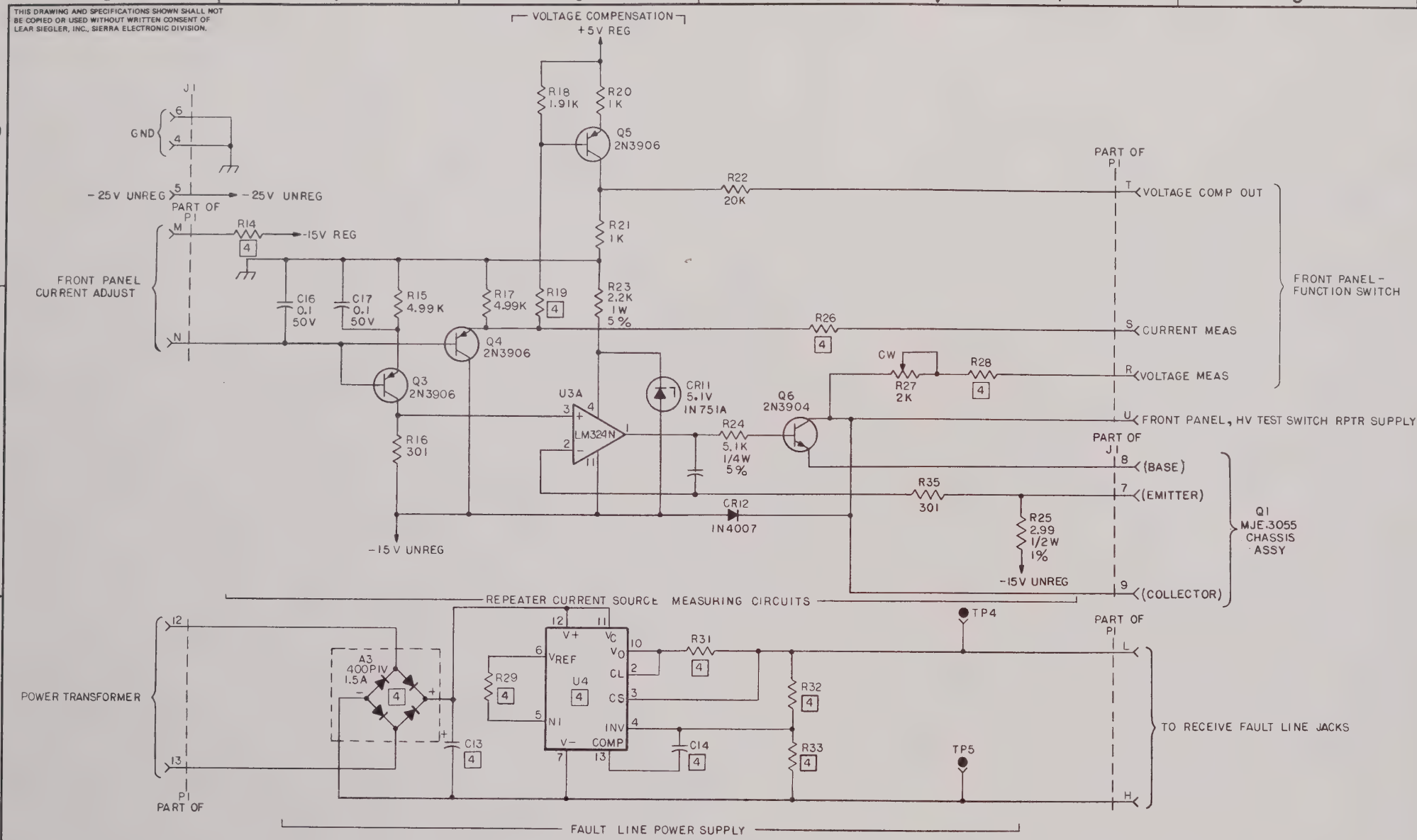

TABLE A			
COMP	-2,	-11	-4
R14	7.15K	15.8K	7.15K
R29	NOT USED	5.36K	NOT USED
R31	NOT USED	100 OHMS	NOT
R32	NOT USED	15.4K	NOT
R33	NOT USED	8.25K	NOT
C13	NOT USED	90uF, 150V	NOT
C14	NOT USED	100PF, 500V	NOT
U4	NOT USED	uA723	NOT
A3	NOT USED	RECT, 400V, 1.5A	NOT USED
R26	7.5K	5.11K	7.5K
R28	16.9K	26.1K	16.9K
R19	8.87K	13K	6.81K

REFERENCE DESIGNATION DATA	
LAST USED	NOT USED
Q6	
R35	R30,34
C17	
U4	
CR12	
TP5	
A3	

NOTES - UNLESS OTHERWISE SPECIFIED:
1. ALL RESISTANCE VALUES ARE IN OHMS
2. ALL RESISTORS ARE 1/8W, ±1%
3. ALL CAPACITANCE VALUES ARE IN MICROFARADS

[4] SEE TABLE "A"

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

63 FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED. REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG. DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED

BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
APPLICATION			415A-11
			415A-4
			415A-2

Sierra — LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025

CODE IDENT. NO. 54778

415A-2,-11,-4
A1 POWER SUPPLY/METER DRIVE

DATE	SIZE	DRAWING NO.	REV.
2/11/77	D	D03197600	C

BY
CHECKED Sierra 4-7-77
APPR
SCALE
STOCK AS
SHEET 1 OF 2

D03197600

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
A1	PWB ASSY, A1, 415A-2, -4	D03197600
C1	CAPACITOR,ELECTROLYTIC 1000MF 50V	902270108
C2	CAPACITOR,ELECTROLYTIC 1000MF 50V	902270108
C3	CAPACITOR ELECTROLYTIC 3300MF 25V	902210338
C4	CAPACITOR CERAMIC .05MF 500V	901400503
C5	CAPACITOR CERAMIC .05MF 500V	901400503
C6	CAPACITOR CERAMIC .05MF 500V	901400503
C7	CAPACITOR CERAMIC .05MF 500V	901400503
C8	CAPACITOR CERAMIC .05MF 500V	901400503
C9	CAPACITOR PLASTIC 1.0MF 25V	903300105
C10	CAPACITOR TANTALUM 10MF 10%,20V	902720106
C11	CAPACITOR TANTALUM 1MF 10%,35V	902740105
C12	CAPACITOR TANTALUM 1MF 10%,35V	902740105
C13	CAPACITOR,ELECTROLYTIC 90MF 150V	902200906
C14	CAPACITOR DIPPED MICA 100PF,5%,500V	901900101
C15	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C16	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C17	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
CR1	DIODE ZENER IN4731A 4.3V 5% 1W	910634731
CR2	DIODE ZENER IN4731A 4.3V 5% 1W	910634731
CR3	DIODE 1N4007	910804007
CR4	DIODE 1N4007	910804007
CR5	DIODE ZENER IN3024B 15V 5% UW	910633051
CR6	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR7	DIODE ZENER IN961B 10V 5% 400MW	910630961
CR8	DIODE,1N191 90V	910500191
CR9	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR10	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR11	DIODE,ZENER,1N751A,5.1V,5% 400MW	910630751
CR12	DIODE 1N4007	910804007
J1	CONNECTOR,NYLON	914800240
Q1	TRANSISTOR,SI,2N3904,NPN	910303904
Q2	TRANSISTOR,SI,2N3904,NPN	910303904
Q3	TRANSISTOR,SI,2N3906,PNP	910303906
Q4	TRANSISTOR,SI,2N3906,PNP	910303906
Q5	TRANSISTOR,SI,2N3906,PNP	910303906
Q6	TRANSISTOR,SI,2N3904,NPN	910303904
R1	RESISTOR COMP 220K OHM 5% 1W2	905000224
R2	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R3	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R4	RESISTOR,MET FILM 1.54K OHM 1/8W 1%	907301541
R5	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R6	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R7	RESISTOR COMP, 1 MEG,OHM,1/4W 5%	906900105
R8	RESISTOR COMP,10K OHM,1/4W,5%	906900103
R9	RESISTOR,FXD,COMP,3K OHM 1/4W 5%	906900302

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
R10	POTENTIOMETER 2K 10% 15 TURN	907900288
R11	RESISTOR MET FILM 1.43K OHM 1% 1/8W	907301431
R12	RESISTOR MET FILM 1.43K OHM 1% 1/8W	907301431
R13	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R14	RESISTOR MET FILM 7.15K OHM 1% 1/8W	907307151
R15	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R16	RESISTOR,MET FILM 301 OHM 1% 1/8W	907301010
R17	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R18	RESISTOR MET FILM 1.91K OHM 1% 1/8W	907301911
R19	RESISTOR MET FILM 6.81K OHM 1% 1/8W	907306811
R20	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R21	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R22	RESISTOR COMP 20.0K OHM 1% 1/8W	907302002
R23	RESISTOR COMP 2.2K OHM 5% 1W	905400222
R24	RESISTOR,FXD,COMP,5.1K OHM 1/4W 5%	906900512
R25	RESISTOR PREC 2.99 OHM 1% 1/2W	906100071
R26	RESISTOR MET FILM 7.50K OHM 1% 1/8W	907307501
R27	POTENTIOMETER 2K 10% 15 TURN	907900288
R28	RESISTOR,MET FILM 16.9K OHM 1% 1/8W	907301692
R29	RESISTOR MET FILM 5.36K OHM 1% 1/8W	907305361
R31	RESISTOR,FXD,FILM 100 OHM 1/8W 1%	907301000
R32	RESISTOR MET FILM 15.4K OHM 1% 1/8W	907301542
R33	RESISTOR COMP 8.25K OHM 1% 1/8W	907308251
R35	RESISTOR,MET FILM 301 OHM 1% 1/8W	907301010
U1	I.C. LM741TC	920310741
U2	I.C. LM741TC	920310741
U3	IC,LM324N,QUAD OPERATIONAL AMP	920300324
U4	IC,LM723CD,VOLTAGE REGULATOR	920300723

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REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		

-15V UNREG

PART OF P1

GND

A1 400 PIV 1.5A

+15V UNREG

A2 400 PIV 1.5A

CR3 IN4007

CR4 IN4007

C4 0.05 500V

C5 0.05 500V

C6 0.05 500V

C7 0.05 500V

R1 220K 1/2 W 5%

CR5 200V IN3051B

C8 0.05 500V

R2 10K

CR6 IN4148

CR7 10V IN9618

HIGH VOLTAGE RECTIFIER

LEAKAGE TEST

R5 10K

+15V REG

R3 10K

R4 1.54K

R6 10K

C9 1.0 25V

U1 UA741TC

R7 1MEG 1/4W 5%

-15V REG

R8 10K 1/4W 5%

CR8 1N191

CR9 IN4148

+5 REG

R9 3K 1/4W 5%

Q1 2N3904

Q2 2N3904

PART OF P1

+15V UNREG

TP1

+15V REG

TP2

-15V REG

TP3

+5V REG

POWER TO OTHER PWB'S

CR1 4.3V IN4731A

C1 1000 50V

CR2 4.3V IN4731A

C2 1000 50V

C3 3300 25V

VR3 INPUT

VR1 INPUT

VR2 INPUT

CHASSIS ASSY

PART OF J1

LAMP TEST

HV TEST SWITCH -200V

METER(-)

METER(+)

FRONT PANEL

R13 10K

C10 10 20V

CR10 IN4148

VOLTAGE COMP IN

METER SIG

CW R10 2K

R11 1.43K

C11 1.0 35V

C12 1.0 35V

+15V REG

U2 UA741TC

R12 1.43K

-15V REG

METER DRIVE

PART OF J1

VR3 OUTPUT, +15V REG → +15V REG

VR1 OUTPUT, -15V REG → -15V REG

VR2 OUTPUT, +5V REG → +5 REG

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

√ FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.

REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.

DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
			415A-11
			415A-4
			415A-2

APPLICATION

Sierra

LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION MENLO PARK, CALIFORNIA 94025

CODE IDENT. NO. 54778

415A-2,-11,-4

A1 POWER SUPPLY/METER DRIVE

DATE 2/16/77 BY CHECKED APPR

SIZE D | DRAWING NO. D03197600 | REV. C

SCALE | STOCK AS | SHEET 2 OF 2

DWG. NO. D03197600

THIS DRAWING AND SPECIFICATIONS SHOWN SHALL NOT BE COPIED OR USED WITHOUT WRITTEN CONSENT OF LEAR SIEGLER, INC., SIERRA ELECTRONIC DIVISION.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE	4-23-76	PAULL
	A1	PCO 1635		
	B	PREPRODUCTION RELEASE	4/7/77	
		PRODUCTION RELEASE	6/7/77	

PART OF P1

+5V (3) — R42 1K 1/4W 5% — +5V — C14 1.0 50V

TP1

PART OF P1 (10) — AUDIO FREQ OUT

4X FAULT FREQ (14) — U1A — U1B — TP4

+15V — R8 4.99K — R9 4.99K

C5 1.0 25V — R14 49.9K

C6 33 PF 500V — U4 LM301 — -15V

R1 3.74K — C1 1.0 50V

U3 MC1596L

C4 10 20V — R13 61.9K

R10 200K — R11 100K CW — -15V

TP2 — R15 5K — R16 8.25K

TP3 — U5 AD532J — R17 5.23K

(+7.5V) — R7 374 — R2 374 — R51 412 — R52 412

SIG IN (13) — C2 1.0 25V

R6 10K — R5 13.7K

R24 1K — R23 2K CW

C7 33 PF 500V — U6 LM301 — -15V

R22 1K

TP7

PART OF P1 (9) — TO METER DRIVE CKT (FUNCTION SW) CORRELATOR OUT

INTEGRATED CIRCUIT SUMMARY DATA			
IC REF DESIGNATION	DEVICE TYPE	+5V	GND
U1	SN74LS74	14	7

+15V — R18 1K — R19 50K CW — R20 1K — -15V

C12 1.0 25V — R38 49.9K — C13 33PF 500V — U8 LM301 — -15V

TP5 — TP6 — U9 AD532J — R41 5.23K

R39 5K CW — R40 8.25K

R34 200K — R35 100K CW — -15V

+15V — R48 15K — Q1 2N3565 — R49 15K — R50 6.98K — R26 374

C17 1.0 50V

C8 1.0 50V — R25 3.74K — R31 374

U7 MC1596L

R33 4.99K — R32 4.99K

C11 10 20V — R37 61.9K

R53 412 — R54 412 — R30 10K

R47 11.3K — R46 11.3K — R28 3.32K — C10 1.0 50V — R27 3.32K — R29 13.7K

-15V (1) — +15V (2) — GND (4) — C16 1.0 50V — C15 1.0 50V

NOTES - UNLESS OTHERWISE SPECIFIED:
1. ALL RESISTANCE VALUES ARE IN OHMS
2. ALL RESISTORS ARE 1/8W, ±1%
3. ALL CAPACITANCE VALUES ARE IN MICROFARADS

REFERENCE DESIGNATION DATA	
LAST USED	NOT USED
R54	R3,4,12,21,36,43-45
C17	C3,9
U9	U2
TP7	
Q1	

DWG. NO. D0319770

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE

LIST OF MATERIAL OR PARTS LIST

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
		APPLICATION	415A-4
			415A-11
			415A-2

Sierra — LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025 — CODE IDENT. NO. 54778

SCHEMATIC DIAGRAM
A2 BOARD
CORRELATOR

DATE	SIZE	DRAWING NO.	REV.
2-1-76	D	D03197700	B

BY — CHECKED — APPR — SCALE — STOCK AS — SHEET 1 OF 1

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
A2	PWB ASSY, A2, 415A-2, -4	D03197700
C1	CAPACITOR,TANTALUM 1.0MF 50V	902760105
C2	CAPACITOR PLASTIC 1.0MF 25V	903300105
C4	CAPACITOR TANTALUM 10MF 10%,20V	902720106
C5	CAPACITOR PLASTIC 1.0MF 25V	903300105
C6	CAPACITOR,DIPPED MICA 33PF 2% 500V	901900330
C7	CAPACITOR,DIPPED MICA 33PF 2% 500V	901900330
C8	CAPACITOR,TANTALUM 1.0MF 50V	902760105
C10	CAPACITOR,TANTALUM 1.0MF 50V	902760105
C11	CAPACITOR TANTALUM 10MF 10%,20V	902720106
C12	CAPACITOR PLASTIC 1.0MF 25V	903300105
C13	CAPACITOR,DIPPED MICA 33PF 2% 500V	901900330
C14	CAPACITOR,TANTALUM 1.0MF 50V	902760105
C15	CAPACITOR,TANTALUM 1.0MF 50V	902760105
C16	CAPACITOR,TANTALUM 1.0MF 50V	902760105
C17	CAPACITOR,TANTALUM 1.0MF 50V	902760105
Q1	TRANSISTOR,SI,2N3565,NPN	910303565
R1	RESISTOR MET FILM 3.74K OHM 1% 1/8W	907303741
R2	RESISTOR,MET FILM 374 OHM 1/8W,1%	907303740
R5	RESISTOR MET FILM 13.7K OHM 1% 1/8W	907301372
R6	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R7	RESISTOR,MET FILM 374 OHM 1/8W,1%	907303740
R8	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R9	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R10	RESISTOR MET FILM 200K OHM 1% 108W	907302003
R11	PCT,100K,10%,15 TURN	907900279
R13	RESISTOR MET FILM 61.9K OHM 1% 1/8W	907306192
R14	RESISTOR MET FILM 49.9K OHM 1% 1/8W	907304992
R15	PCT,50K,10%,15 TURN 100PPM	907900338
R16	RESISTOR COMP 8.25K OHM 1% 1/8W	907308251
R17	RESISTOR MET FILM 5.23K OHM 1% 1/8W	907305231
R18	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R19	PCT,50K,10%,15 TURN 100PPM	907900338
R20	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R22	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R23	POTENTIOMETER 2K 10% 15 TURN	907900288
R24	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R25	RESISTOR MET FILM 3.74K OHM 1% 1/8W	907303741
R26	RESISTOR,MET FILM 374 OHM 1/8W,1%	907303740
R27	RESISTOR MET FILM 3.32K OHM 1% 1/8W	907303321
R28	RESISTOR MET FILM 3.32K OHM 1% 1/8W	907303321
R29	RESISTOR MET FILM 13.7K OHM 1% 1/8W	907301372
R30	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R31	RESISTOR,MET FILM 374 OHM 1/8W,1%	907303740
R32	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R33	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R34	RESISTOR MET FILM 200K OHM 1% 108W	907302003
R35	POT,100K,10%,15 TURN	907900279
R37	RESISTOR MET FILM 61.9K OHM 1% 1/8W	907306192
R38	RESISTOR MET FILM 49.9K OHM 1% 1/8W	907304992
R39	POT,5K,10%,15 TURN	907900316

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
R40	RESISTOR COMP 8.25K OHM 1% 1/8W	907308251
R41	RESISTOR MET FILM 5.23K OHM 1% 1/8W	907305231
R42	RESISTOR,FXD,COMP 1K OHM 1/4W 5%	906900102
R46	RESISTOR MET FILM 11.3K OHM 1% 1/8W	907301132
R47	RESISTOR MET FILM 11.3K OHM 1% 1/8W	907301132
R48	RESISTOR,FXD,FILM 15.0K OHM 1/8W 1%	907301502
R49	RESISTOR,FXD,FILM 15.0K OHM 1/8W 1%	907301502
R50	RESISTOR MET FILM 6.98K OHM 1% 1/8W	907306981
R51	RESISTOR MET FILM 412 OHM 1% 1/8W	907304120
R52	RESISTOR MET FILM 412 OHM 1% 1/8W	907304120
R53	RESISTOR MET FILM 412 OHM 1% 1/8W	907304120
R54	RESISTOR MET FILM 412 OHM 1% 1/8W	907304120
U1	IC,SN74LS74,DUAL FLIP-FLOP	920317474
U3	IC,MC1596L,MODULATOR-DEMODULATOR	920301596
U4	IC,LM301AN,OPERATIONAL AMP	920300301
U5	IC,AD532JD,MULTIPLIER DECODER	920300532
U6	IC,LM301AN,OPERATIONAL AMP	920300301
U7	IC,MC1596L,MODULATOR-DEMODULATOR	920301596
U8	IC,LM301AN,OPERATIONAL AMP	920300301
U9	IC,AD532JD,MULTIPLIER DECODER	920300532

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REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE	8/15/77	M.PAULL
	A5	PCO 1888,1912,1951,1956,2327		
	B	PRE PRODUCTION RELEASE	9/21/77	
	B_1	PCO 2602	3/29/78	
	C	PRODUCTION RELEASED	5/30/78	

PART OF P1

+5V, +15V, GND

C19 10, C21 0.1, C26 0.1, C25 0.1, C24 0.1, C23 0.1, C27 0.1

C20 1.0, C22 0.1, C28 0.1, C29 0.1

TP GND

C18 0.1, T1, R1 330, R2 160, R3 160, C2 1.0, R5 1.00K

CR1, CR2, CR3, C1 0.1, U22

TP9, TP10, TP3

U23, R14 1MEG, R16 1MEG, R13 1K, R15 1K, R17 1.5K, R18 1.5K, CR4, CR5, CR23, CR24, R46 24K

R4 13.7K, R12 6.04K, R50 121K, R49 100, R7 200, C3 1.0, PART OF U22

R51 12.1K, Q6 2N3904, R52 3.3K

U3, U5, U7, U13

C5 56PF, R20 1K, C6 56PF, R19 1K

C15 150PF, R36 82.5K, U1, 2.2K, U2, U21, R40 680, R41 51

R37 150K, C16 1.0, CR19, R42 22, CR20

PART OF P1

14 EXT ERRORS

11 ERROR

12 LAMP TEST

A, B, C, D, E, F

SEE SHEET 2

HIGHEST REFERENCE DESIGNATION			
R47	C26	MV1	
Q5	U22	CR24	

REFERENCE DESIGNATION NOT USED

IC POWER PIN-OUT

REF DESIG	IC TYPE	+5V	GND	+15V
U4	CA3127E	-	-	-
U23	LM319	-	3,6,8	11
U3,10,11,18	SN74LS73	4	11	-
U13,19,5,7	SN74LS00	14	7	-
U2	96L02	16	8	-
U20	LM339N	-	12	3
U16,15	CA3080E	-	4	7
U21	SN75492	11	4	-
U8	SN74121	14	7	-
U12	SN74LS10	14	7	-
U22	FS4271GM	-	-	-
U6	SN74LS04	14	7	-

NOTES - UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER, ASSEMBLY DESIGNATION OR BOTH
2. ALL RESISTANCE VALUES ARE IN OHMS
3. ALL CAPACITANCE VALUES ARE IN MICROFARADS
4. ALL DIODES ARE 1N4148
5. ALL TRANSISTORS ARE 2N4258
6. ALL INDUCTANCE VALUES ARE IN MICROHENRYS
7. ⏚ DENOTES GROUND RETURN

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A, INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

$\sqrt{}$ FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.

REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.

DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		
FINISH:		

Sierra — CODE IDENT. NO. 54778

LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025

SCHEMATIC DIAGRAM - 415A-4 A3 PWB

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
		APPLICATION	415A-4

DATE 9/12/77 BY CHECKED APPR

SIZE D | DRAWING NO. D03230100 | REV. C

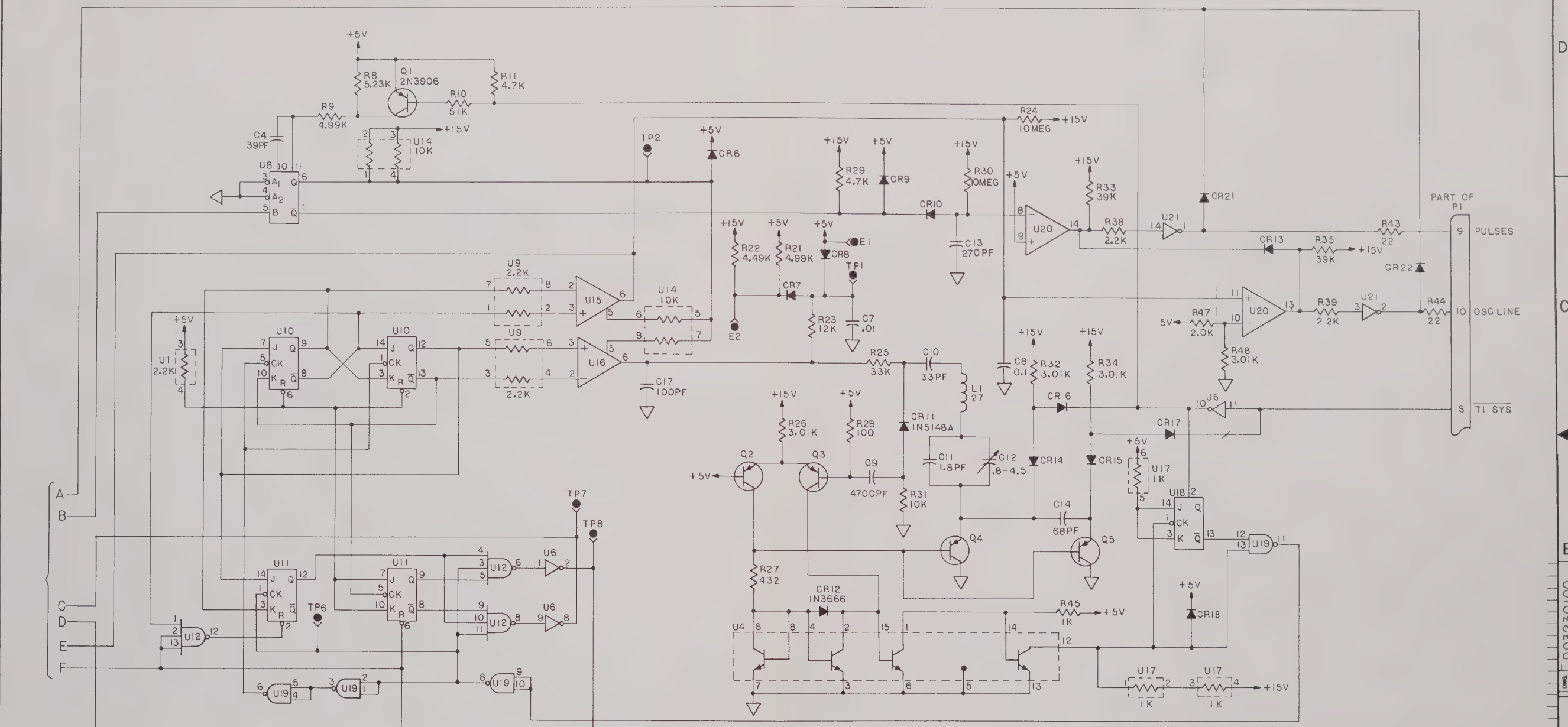
SCALE | STOCK AS | SHEET 1 OF 2

DWG. NO. D03230100

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
A3	PWB ASSY, A3, 415A-4	D03230100
C1	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C2	CAPACITOR TANTALUM 1MF 10%,35V	902740105
C3	CAPACITOR TANTALUM 1MF 10%,35V	902740105
C4	CAPACITOR,DIPPED MICA 39PF 5% 500V	901900390
C5	CAPACITOR,MICA,56PF,5%,500V	901900560
C6	CAPACITOR,MICA,56PF,5%,500V	901900560
C7	CAPACITOR,CER,0.1MF,10%,100V	901320103
C8	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C9	CAPACITOR,CER,4700PF,10%,100V	901320472
C10	CAPACITOR,CER,33PF,2%,100V	901430330
C11	CAPACITOR,CER,1.8PF,.25PF,1000V	901400018
C12	CAPACITOR,VAR,.8-4.5PF,PISTON,TRIMMER	903000450
C13	CAPACITOR,DIPPED MICA 270PF 5% 500V	901900271
C14	CAPACITOR,CER,68PF,2%,100V	901420680
C15	CAPACITOR,DIPPED MICA 150PF 5% 500V	901900151
C16	CAPACITOR TANTALUM 1MF 10%,35V	902740105
C17	CAPACITOR DIPPED MICA 100PF,5%,500V	901900101
C18	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C19	CAPACITOR TANTALUM 10MF 10%,20V	902720106
C20	CAPACITOR TANTALUM 1MF 10%,35V	902740105
C21	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C22	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C23	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C24	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C25	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C26	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C27	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C28	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C29	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
CR1	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR2	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR3	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR4	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR5	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR6	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR7	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR8	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR9	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR10	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR11	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR12	DIODE,GE,IN3666,80V,200MA,75MW	910503666
CR13	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR14	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR15	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR16	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR17	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR18	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR19	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR20	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR21	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR22	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR23	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
CR24	DIODE,SI,IN5139A,47PF,4.0V,400MW	910505148
L1	INDUCTOR,FXD,10%,2	909000139
Q1	TRANSISTOR,SI,2N3906,PNP	910303906
Q2	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
Q3	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
Q4	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
Q5	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
Q6	TRANSISTOR,SI,2N3904,NPN	910303904
R1	RESISTOR,FXD,COMP,330 OHM 104W 5%	906900331
R2	RESISTOR,FXD,COMP,160 OHM 1/4W 5%	906900161
R3	RESISTOR,FXD,COMP,160 OHM 1/4W 5%	906900161
R4	RESISTOR MET FILM 13.7K OHM 1% 1/8W	907301372
R5	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R7	RESISTOR MET FILM 200 OHM 1% 1/8W	907302000
R8	RESISTOR MET FILM 5.23K OHM 1% 1/8W	907305231
R9	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R10	RESISTOR COMP 51K OHM 5% 1/4W	906900513
R11	RESISTOR,FXD,COMP,4.7K OHM 1/4W 5%	906900472
R12	RESISTOR MET FILM 6.04K OHM 1% 1/8W	907306041
R13	RESISTOR,FXD,COMP 1K OHM 1/4W 5%	906900102
R14	RESISTOR COMP, 1 MEG,OHM,1/4W 5%	906900105
R15	RESISTOR,FXD,COMP 1K OHM 1/4W 5%	906900102
R16	RESISTOR COMP, 1 MEG,OHM,1/4W 5%	906900105
R17	RESISTOR,FXD,COMP,1.5K OHM 1/4W 5%	906900152
R18	RESISTOR,FXD,COMP,1.5K OHM 1/4W 5%	906900152
R19	RESISTOR,FXD,COMP 1K OHM 1/4W 5%	906900102
R20	RESISTOR,FXD,COMP 1K OHM 1/4W 5%	906900102
R21	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R22	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R23	RESISTOR,FXD,COMP, 12K OHM 1/4W 5%	906900123
R24	RESISTOR,COMP,10 MEG OHM,5% 1/4W	906900106
R25	RESISTOR,FXD,COMP,33K OHM 1/4W 5%	906900333
R26	RESISTOR,FXD,FILM 3.01K OHM 1/8W 1%	907303011
R27	RESISTOR,FXD,FILM 432 OHM 1/8W 1%	907304320
R28	RESISTOR,FXD,COMP 100 OHM 1/4W 5%	906900101
R29	RESISTOR,FXD,COMP,4.7K OHM 1/4W 5%	906900472
R30	RESISTOR,COMP,10 MEG OHM,5% 1/4W	906900106
R31	RESISTOR COMP,10K OHM,1/4W,5%	906900103
R32	RESISTOR,FXD,FILM 3.01K OHM 1/8W 1%	907303011
R33	RESISTOR,COMP,39K OHM,5%,1/4W	906900393
R34	RESISTOR,FXD,FILM 3.01K OHM 1/8W 1%	907303011
R35	RESISTOR,COMP,39K OHM,5%,1/4W	906900393
R36	RESISTOR MET FILM 82.5K OHM 1% 1/8W	907308252
R37	RESISTOR,COMP,150K OHM,5%,1/4W	906900154
R38	RESISTOR,FXD,COMP,2.2K OHM 1/4W 5%	906900222
R39	RESISTOR,FXD,COMP,2.2K OHM 1/4W 5%	906900222
R40	RESISTOR COMP 680 OHM 5% 1/4W	906900681
R41	RESISTOR,FXD,COMP,51 OHM 1/4W 5%	906900510
R42	RESISTOR,FXD,COMP,22 OHM 1/4W 5%	906900220

THIS DRAWING AND SPECIFICATIONS SHOWN SHALL NOT BE COPIED OR USED WITHOUT WRITTEN CONSENT OF LEAR SIEGLER, INC., SIERRA ELECTRONIC DIVISION.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	–	SEE SHEET 1		



QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION	±	

FINISH:

Sierra — CODE IDENT. NO. 54778
LEAR SIEGLER, INC.
SIERRA ELECTRONIC DIVISION
MENLO PARK, CALIFORNIA 94025

SCHEMATIC DIAGRAM – 415A-4 A3 PWB

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
			415A-4
APPLICATION			

DATE 9/24/77
BY
CHECKED
APPR

SIZE	DRAWING NO.	REV.
D	D03230100	C

SCALE — STOCK AS — SHEET 2 OF 2

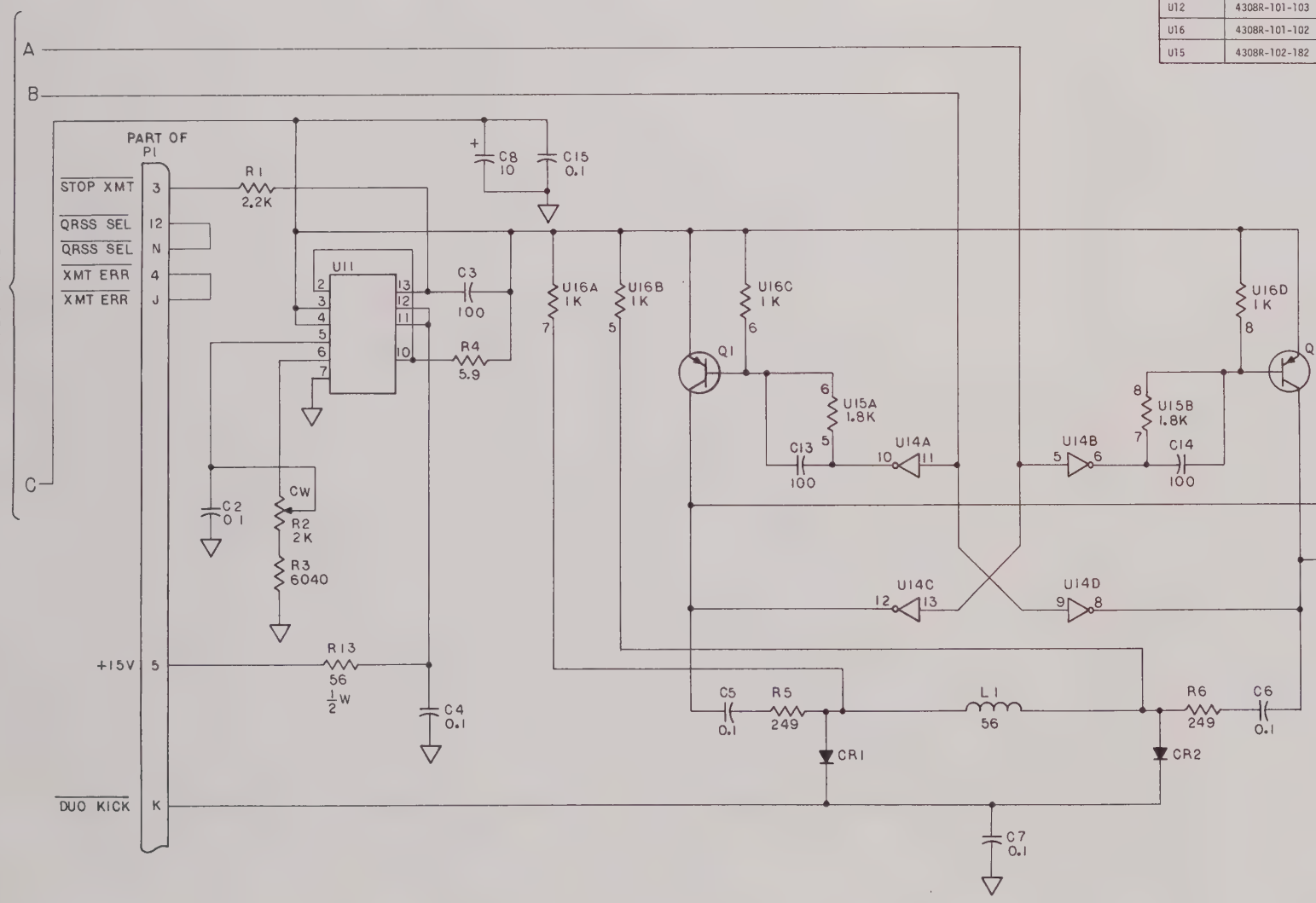
DWG. NO. D03230100

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
R43	RESISTOR,FXD,COMP,22 OHM 1/4W 5%	906900220
R44	RESISTOR,FXD,COMP,22 OHM 1/4W 5%	906900220
R45	RESISTOR,FXD,COMP 1K OHM 1/4W 5%	906900102
R46	RESISTOR COMP 24K OHM 5% 1/4W	906900243
R47	RESISTOR,FILM,2.00K OHM 1%,1/8W	907302001
R48	RESISTOR,FXD,FILM 3.01K OHM 1/8W 1%	907303011
R49	RESISTOR,FXD,FILM 100 OHM 1/8W 1%	907301000
R50	RESISTOR MET FILM 121K OHM 1/8W 1%	907301213
R51	RESISTOR MET FILM 12.1K OHM 1% 1/8W	907301212
R52	RESISTOR,COMP,3.3K OHM,5%,1/4W	906900332
T1	TRANSFORMER TOROIDAL 6MH 20% CTI TO ICT	909300013
U1	RESISTOR ISOLATED NETWORK 2.2K OHM 2% 1/8W	920880222
U2	IC,96L02PC,DUAL FLIP-FLOP	920309602
U3	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U4	IC,SN74LS00N,QUAD 2 INPUT NAND GATE	920327400
U5	IC,SN74LS00N,QUAD 2 INPUT NAND GATE	920327400
U6	IC,SN74LS04N,HEX INVERTER	920327404
U7	IC,SN74LS00N,QUAD 2 INPUT NAND GATE	920327400
U8	I.C. SN74121, MONO MV	920300105
U9	RESISTOR ISOLATED NETWORK 2.2K OHM 2% 1/8W	920880222
U10	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U11	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U12	IC,SN74LS10N,TRIPLE 3 INPUT NAND GATE	920327410
U13	IC,SN74LS00N,QUAD 2 INPUT NAND GATE	920327400
U14	RESISTOR,10K OHM,2%,1/8W	920880103
U15	INTEGRATED CIRCUIT,8 PIN DIP CA3080E	920303080
U16	INTEGRATED CIRCUIT,8 PIN DIP CA3080E	920303080
U17	RESISTOR,1K OHM,2%,1/8W	920880102
U18	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U19	IC,SN74LS00N,QUAD 2 INPUT NAND GATE	920327400
U20	IC,LM339N,QUAD VOLTAGE COMPARATOR	920300339
U21	IC,SN75492PC,MOS TO VLED DRIVER	920375492
U22	IC,FS2719M,DIODE ARRAY	920302719
U23	IC,LM319N,DUAL COMPARATOR,HIGH SPEED	920300319

THIS DRAWING AND SPECIFICATIONS SHOWN SHALL NOT BE COPIED OR USED WITHOUT WRITTEN CONSENT OF LEAR SIEGLER, INC., SIERRA ELECTRONIC DIVISION.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE	8/1978	M. PAULL
	A2	PCO 1889, 1929		
	B	PREPRODUCTION RELEASE	9/21/77	
		PRODUCTION RELEASE	3/30/78	M Drew

IC POWER PIN-OUT				
REF DESIG	IC TYPE	+5V	GND	SPARES
U7	SN74LS10N	14	7	
U2	SN74LS86N	14	7	
U18	SN74LS163N	16	8	
U1,8,9,17	SN74LS73N	4	11	U17B
U13	SN74LS20N	14	7	
U3,6	SN74LS00N	14	7	U3D
U19	SN74LS04N	14	7	
U4,5	SN74LS112N	16	8	
U11	UA723C	x	7	
U10	SN74LS02N	14	7	
U14	SN7416N	14	7	
U12	4308R-101-103	1	x	
U16	4308R-101-102	1	x	U16G
U15	4308R-102-182	x	x	



NOTES - UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER, ASSEMBLY DESIGNATION OR BOTH
2. ALL RESISTANCE VALUES ARE IN OHMS
3. ALL CAPACITANCE VALUES ARE IN MICROFARADS
4. ALL DIODES ARE 1N4148
5. ALL TRANSISTORS ARE 2N4258
6. ALL INDUCTANCE VALUES ARE IN MICROHENRYS
7. ⏚ DENOTES GROUND RETURN

D03230200 REV B

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
LIST OF MATERIAL OR PARTS LIST								

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A, INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED

BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION	±	

FINISH:

Sierra — LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025

CODE IDENT. NO. 54778

SCHEMATIC DIAGRAM - A4 PATTERN GENERATOR/PULSE DRIVER

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
		APPLICATION	415A-4

DATE 9/11/77 BY CHECKED APPR

SIZE D | DRAWING NO. D03230200 | REV. B | SCALE | STOCK AS | SHEET 1 OF 2

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
A4	PWB ASSY, A4, 415A-4	D03230200
C1	CAPACITOR TANTALUM 10MF 10%,20V	902720106
C2	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C3	CAPACITOR DIPPED MICA 100PF,5%,500V	901900101
C4	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C5	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C6	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C7	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C8	CAPACITOR TANTALUM 10MF 10%,20V	902720106
C9	CAPACITOR,MICA,3300PF,2%,500V	901900332
C10	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C11	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C12	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C13	CAPACITOR DIPPED MICA 100PF,5%,500V	901900101
C14	CAPACITOR DIPPED MICA 100PF,5%,500V	901900101
C15	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C16	CAPACITOR CERAMIC .05MF 500V	901400503
CR1	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR2	DIODE,SI,IN4148,75V,150MA,500MW	910504148
L1	INDUCTOR,FXD,56UH,5%,.22W	909000141
Q1	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
Q2	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
Q3	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
Q4	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
R1	RESISTOR,FXD,COMP,2.2K OHM 1/4W 5%	906900222
R2	POTENTIOMETER 2K 10% 15 TURN	907900288
R3	RESISTOR MET FILM 6.04K OHM 1% 1/8W	907306041
R4	RESISTOR,FXD,FILM 5.9 OHM 1/8W 1% 100PPM	907305R90
R5	RESISTOR,249 OHM,1%,1/8W	907302490
R6	RESISTOR,249 OHM,1%,1/8W	907302490
R7	RESISTOR MET FILM 41.2 OHM 1% 1/8W	907341R20
R8	RESISTOR,453 OHM,1%,1/8W	907304530
R9	RESISTOR MET FILM 41.2 OHM 1% 1/8W	907341R20
R10	RESISTOR,453 OHM,1%,1/8W	907304530
R11	RESISTOR,453 OHM,1%,1/8W	907304530
R12	RESISTOR,249 OHM,1%,1/8W	907302490
R13	RESISTOR,56 OHM,5%,1/2W	905000560
T1	TRANSFORMER,ELECTROSTATIC SHIELD	909910013
T2	TRANSFORMER TOROIDAL 6MH 20% CTI TO ICT	909300013
U1	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U2	IC,74LS86PC,QUAD 2 INPUT EXCLUSIVE OR GATE	920317486
U3	IC,SN74LS00N,QUAD 2 INPUT NAND GATE	920327400
U4	INTEGRATED CIRCUIT,74LS112PC	920374112
U5	INTEGRATED CIRCUIT,74LS112PC	920374112
U6	IC,SN74LS00N,QUAD 2 INPUT NAND GATE	920327400
U7	IC,SN74LS10N,TRIPLE 3 INPUT NAND GATE	920327410
U8	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U9	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U10	INTEGRATED CIRCUIT,SN74LS02N	920337402
U11	IC,LM723CD,VOLTAGE REGULATOR	920300723
U12	RESISTOR,10K OHM,2%,1/8W	920680103
U13	IC,SN74LS20N,DUAL 4 INPUT NAND GATE	920317420
U14	INTEGRATED CIRCUIT 7416PC	920307416
U15	RESISTOR,1.8K,2%,1/8W	920880182
U16	RESISTOR,1K,2%,1/8W	920680102
U17	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U18	INTEGRATED CIRCUIT,74LS163PC	920374163
U19	IC,SN74C4N,HEX INVERTER	920317404

THIS DRAWING AND SPECIFICATIONS SHOWN SHALL NOT BE COPIED OR USED WITHOUT WRITTEN CONSENT OF LEAR SIEGLER, INC., SIERRA ELECTRONIC DIVISION.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	–	SEE SHEET 1		

PART OF P1

QRSS ERR 1111 FUNC L 10 — +5V A 1 — GND B 2

C1 10 — C10 0.1 — C11 0.1 — C12 0.1

PP BCD 1 7 — PP BCD 2 8 — PP BCD 4 6

DUO SYS M — AUDIO 18

MEAS 1 FUNC 11 — MEAS 2 FUNC 13 — MEAS 3 FUNC 9

QRSS DATA H — QRSS CLK E — ENC CLK F

IDLE SIG PHASE CONTROL P

U1A U1B U2A U2B U2C U2D U3A U3B U3C U3D U4A U4B U5A U5B U6A U6B U6C U6D U7A U7B U7C U8A U8B U9A U9B U10A U10B U10C U10D U12A 10K U12B 10K U12C 10K U12D 10K U12E 10K U12F 10K U12G 10K U13A U13B U14E U14F U15C 1.8K U15D 1.8K U16E 1K U16F 1K U17A U18 U19A U19B U19C U19D U19E U19F

TP1 TP2 TP3 A B C

Q3 Q4 T2 R11 453 R12 249 C9 3300

PART OF P1 — T INTF CLR — D IDLE SIG

SEE SHEET 1

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.

REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.

DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		
FINISH:		

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
			415A-4
APPLICATION			

Sierra — LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025 — CODE IDENT. NO. 54778

SCHEMATIC DIAGRAM A4 PATTERN GENERATOR/PULSE DRIVER

DATE 9/10/79 — BY — CHECKED — APPR.

SIZE D — DRAWING NO. D03230200 — REV. B

SCALE — STOCK AS — SHEET 2 OF 2

DWG. NO. D03230200

THIS DRAWING AND SPECIFICATIONS SHOWN SHALL NOT BE COPIED OR USED WITHOUT WRITTEN CONSENT OF LEAR SIEGLER, INC., SIERRA ELECTRONIC DIVISION.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE	8/19/76	M. PAULL
	A4	PCO 1680, 1890, 1942, 2332		
	B	PRE PRODUCTION RELEASE	9/30/77	
	B2	PCO 2479, 2564	4/14/77	
	C	PRODUCTION RELEASE	3/31/78	M Dixon

PART OF P1

+5V
GND
T1 SYS
DUO SYS
DUO KICK
XMT ERR
QRSS SEL

R1 2370, R3 909, R5 4320, R6 2370, R8 2370, U13A 10K
C10 33PF, Y1
Q1 2N4258, Q2 2N4258, Q3 2N4274
R2 2370, R4 681, R7 681
C1 10, C6 10, C7 0.1, C8 0.1, C9 0.1, C2 0.1, C3 0.1
U13B 10K, U13C 10K, U13D 10K
U1, C4 6-60, C5 15
U13E 10K, U13F 10K

U4A, U3A, U2A, U3B, U12B, U6C, U6B, U4E, U5A, U4D, U12C, U4, U12D, U6A, U2D, U4B, U5B, U3C, U2C, U2B, U12A, U14B, U6D, U7B, U7A, U14A, U14C, U11A, U11B, U15

U8, U9, U10 (CLR, CK, D, Q)

TP1, TP2, TP3, TP4, TP5, TP6

PART OF P1

13 IDLE SIG PHASE CONTROL
6 ENC CLK
5 QRSS CLK
7 QRSS DATA
10 QRSS ERR
C WORD SYNC

IC POWER PIN-OUT

REF DESIG	IC TYPE	+5V	GND	SPARES
U1	OSC, 6.30MHz	14	7	
U4	SN74LS04N			
U3	SN74LS00N			
U2	SN74LS86N			
U12	SN74LS02N			
U8,9	SN74LS164N			
U14	SN74LS27N			
U6	SN74LS28N			
U7	SN74LS260A			
U15	SN74LS30N			
U11	SN74LS20N	14	7	
U5	SN74LS73N	4	11	
U13	4308R-101-103	1		U13G
U10	SN74LS174	16	8	

NOTES - UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER, ASSEMBLY DESIGNATION OR BOTH
2. ALL RESISTANCE VALUES ARE IN OHMS
3. ALL CAPACITANCE VALUES ARE IN MICROFARADS
4. ⏚ DENOTES GROUND RETURN

QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE

LIST OF MATERIAL OR PARTS LIST

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

63 FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		
FINISH:		

QTY. NEXT ASSY.	NEXT ASSY.	MODEL NO.
—	—	415A-4

ASSY. OR ITEM — APPLICATION

Sierra — CODE IDENT. NO. 54778
LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION
MENLO PARK, CALIFORNIA 94025

SCHEMATIC DIAGRAM — A5 CLOCK OSC/QRSS

DATE 2/8/77 | BY | CHECKED | APPR

SIZE D | DRAWING NO. D03230300 | REV. C

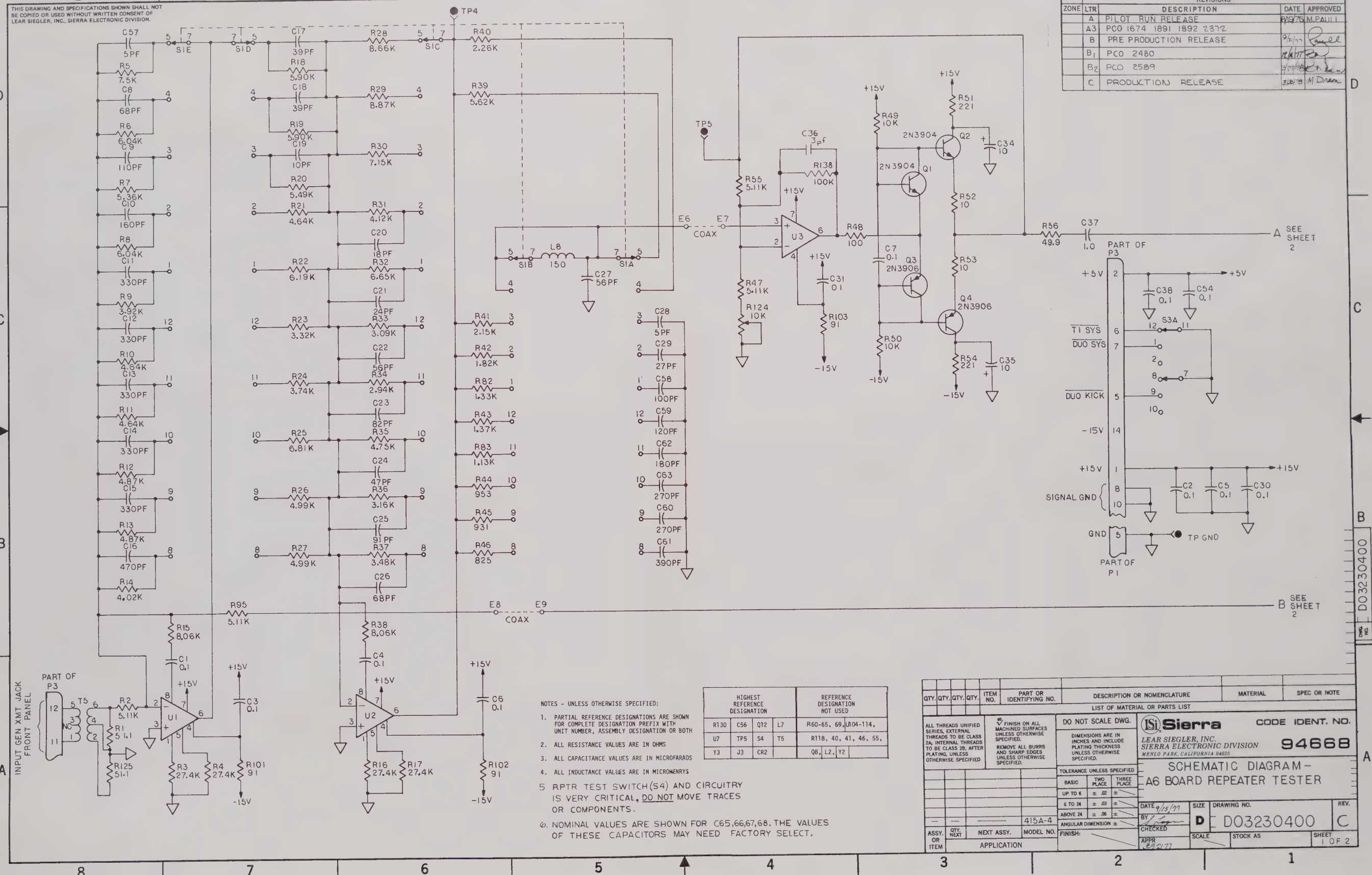
SCALE | STOCK AS | SHEET 1 OF 1

DWG. NO. D03230300

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
A5	PWB ASSY, A5, 415A-4	D03230300
C1	CAPACITOR TANTALUM 10MF 10%,20V	902720106
C2	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C3	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C4	CAPACITOR,5.5-60PF,VAR,	903210600
C5	CAPACITOR,DIPPED MICA 15PF 5% 500V	901900150
C6	CAPACITOR TANTALUM 10MF 10%,20V	902720106
C7	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C8	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C9	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C10	CAPACITOR,DIPPED MICA 33PF 2% 500V	901900330
Q1	TRANSISTOR,PNP,SI 2N2894	910302894
Q2	TRANSISTOR,PNP,SI 2N2894	910302894
Q3	TRANSISTOR,SI,2N4274,NPN	910304274
R1	RESISTOR,2.37K OHM,1%,1/8W	907302371
R2	RESISTOR,2.37K OHM,1%,1/8W	907302371
R3	RESISTOR,MET,909 OHM,1%,1/8W	907309090
R4	RESISTOR MET FILM 681 OHM 1/8W 1%	907306810
R5	RESISTOR,MET,4.32K OHM,1%,1/8W	907304321
R6	RESISTOR,2.37K OHM,1%,1/8W	907302371
R7	RESISTOR MET FILM 681 OHM 1/8W 1%	907306810
R8	RESISTOR,2.37K OHM,1%,1/8W	907302371
U1	OSCILLATOR,6.304 MHZ	912400004
U2	IC,74LS86PC,QUAD 2 INPUT EXCLUSIVE OR GATE	920317486
U3	IC,SN74LS00N,QUAD 2 INPUT NAND GATE	920327400
U4	IC,SN74LS04N,HEX INVERTER	920327404
U5	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U6	INTEGRATED CIRCUIT,QUAD,SN74LS28N	920307428
U7	INTEGRATED CIRCUIT,DUAL,N74LS260A	920374260
U8	IC,74LS164PC,8 BIT OUT SHIFT REGISTER	920374164
U9	IC,74LS164PC,8 BIT OUT SHIFT REGISTER	920374164
U10	INTEGRATED CIRCUIT,QUAD,SN74LS174N	920374174
U11	IC,SN74LS20N,DUAL 4 INPUT NAND GATE	920317420
U12	INTEGRATED CIRCUIT,SN74LS02N	920337402
U13	RESISTOR,10K OHM,2%,1/8W	920680103
U14	IC,SN74LS27N,DUAL 4 INPUT NAND GATE	920317427
U15	IC,74LS30PC,8 INPUT NAND GATE	920317430
XY1	CLIP,CRYSTAL,HOLDING STEEL	921100004
Y1	CRYSTAL,QUARTZ,3.088 MHZ	912200199

THIS DRAWING AND SPECIFICATIONS SHOWN SHALL NOT BE COPIED OR USED WITHOUT WRITTEN CONSENT OF LEAR SIEGLER, INC., SIERRA ELECTRONIC DIVISION.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE	8/9/76	M.PAULL
	A3	PCO 1674 1891 1892 2372		
	B	PRE PRODUCTION RELEASE	9/2/77	
	B_1	PCO 2480	12/6/77	
	B_2	PCO 2589	4/27/78	
	C	PRODUCTION RELEASE	3/29/78	M Dixon



HIGHEST REFERENCE DESIGNATION				REFERENCE DESIGNATION NOT USED
R130	C56	Q12	L7	R60-65, 69, U104-114,
U7	TP5	S4	T5	R118, 40, 41, 46, 55,
Y3	J3	CR2		Q8, L2, Y2

NOTES - UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATION PREFIX WITH UNIT NUMBER, ASSEMBLY DESIGNATION OR BOTH
2. ALL RESISTANCE VALUES ARE IN OHMS
3. ALL CAPACITANCE VALUES ARE IN MICROFARADS
4. ALL INDUCTANCE VALUES ARE IN MICROHENRYS
5. RPTR TEST SWITCH (S4) AND CIRCUITRY IS VERY CRITICAL, DO NOT MOVE TRACES OR COMPONENTS.
6. NOMINAL VALUES ARE SHOWN FOR C65,66,67,68. THE VALUES OF THESE CAPACITORS MAY NEED FACTORY SELECT.

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.

DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

Sierra
LEAR SIEGLER, INC.
SIERRA ELECTRONIC DIVISION
MENLO PARK, CALIFORNIA 94025

CODE IDENT. NO. 94668

SCHEMATIC DIAGRAM - A6 BOARD REPEATER TESTER

ASSY. OR ITEM	QTY NEXT	NEXT ASSY.	MODEL NO.
		APPLICATION	415A-4

DATE 9/15/77 BY CHECKED APPR 9/21/77

SIZE D | DRAWING NO. D03230400 | REV. C

SCALE | STOCK AS | SHEET 1 OF 2

DWG. NO. D03230400

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
A6	PWB ASSY, A6, 415A-4	D03230400
C1	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C2	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C3	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C4	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C5	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C6	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C7	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C8	CAPACITOR,DIPPED MICA 68PF 2% 500V	901900680
C9	CAPACITOR,MICA 110PF,2%,500VDCW	901900111
C10	CAPACITOR,DIPPED,MICA 160PF 1% 500V	901900161
C11	CAPACITOR,DIPPED MICA 330PF 5% 50V	901900331
C12	CAPACITOR,DIPPED MICA 330PF 5% 50V	901900331
C13	CAPACITOR,DIPPED MICA 330PF 5% 50V	901900331
C14	CAPACITOR,DIPPED MICA 330PF 5% 50V	901900331
C15	CAPACITOR,DIPPED MICA 330PF 5% 50V	901900331
C16	CAPACITOR,MICA 470PF,5%,500VDCW	901900471
C17	CAPACITOR,DIPPED MICA 39PF 5% 500V	901900390
C18	CAPACITOR,DIPPED MICA 39PF 5% 500V	901900390
C19	CAPACITOR,MICA 10PF + 5%,500VDCW	901900100
C20	CAPACITOR,DIPPED MICA 18PF 5% 500V	901900180
C21	CAPACITOR,MICA 24PF,2%,500VDCW	901900240
C22	CAPACITOR,MICA,56PF,5%,500V	901900560
C23	CAPACITOR,DIPPED MICA 82PF 2% 500V	901900820
C24	CAPACITOR,MICA 47PF,1%,500VDCW	901910470
C25	CAPACITOR,MICA 91PF,2%,500VDCW	901900910
C26	CAPACITOR,DIPPED MICA 68PF 2% 500V	901900680
C27	CAPACITOR,MICA,56PF,5%,500V	901900560
C28	CAPACITOR,DIPPED,MICA,5PF 10% 500V	901900050
C29	CAPACITOR DURA MICA 27PF 2% 500V	901910270
C30	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C31	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C32	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C33	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C34	CAPACITOR TANTALUM 10MF 10%,20V	902720106
C35	CAPACITOR TANTALUM 10MF 10%,20V	902720106
C36	CAPACITOR,MICA 3PF,.5PF,500VDCW	901900030
C37	CAPACITOR,MYLAR,1.0UF,2%,100V	901100105
C38	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C39	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C42	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C43	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C44	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C45	CAPACITOR,DIPPED MICA 33PF 2% 500V	901900330
C47	CAPACITOR,DIPPED MICA 33PF 2% 500V	901900330
C48	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C49	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C50	CAPACITOR,DIPPED MICA 100PF 2% 500V	901910101
C51	CAPACITOR,DIPPED MICA 220PF 5% 50V	901900221
C52	CAPACITOR,DIPPED MICA 100PF 2% 500V	901910101
C53	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C54	CAPACITOR,RADIAL LEADS 0.1MF,10%,100V	901330104
C56	CAPACITOR,DIPPED MICA 560PF 5% 300V	901900561
C57	CAPACITOR,DIPPED,MICA,5PF 10% 500V	901900050
C58	CAPACITOR,DIPPED MICA 100PF 2% 500V	901910101
C59	CAPACITOR,MICA,120PF,2%,500VDCW	901910121
C60	CAPACITOR,DIPPED MICA 270PF 5% 500V	901900271
C61	CAPACITOR,DIPPED MICA 390PF 5% 500V	901900391
C62	CAPACITOR,DIPPED MICA 180PF 5% 500V	901900181
C63	CAPACITOR,DIPPED MICA 270PF 5% 500V	901900271
C65	CAPACITOR,CER,1PF + OR - .1,10V	901300109
C66	CAPACITOR,CER,2.7PF + OR - .1,100V	901300279
C67	CAPACITOR,CER,1PF + OR - .1,10V	901300109
C68	CAPACITOR,CER 3.3PF 100V	901300339
CR1	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR2	DIODE,SI,IN4148,75V,150MA,500MW	910504148
J1	CONNECTOR,6 PIN,POLAR	914800206
J2	CONNECTOR,11 PIN,.156 CENTERS	914800307
J3	SOCKET,DIP 14 PIN	914200086
L1	INDUCTOR ENCAPSULATED 100UH NON	909000103
L3	INDUCTOR,68UH,5%,.22W	909000136
L4	INDUCTOR,68UH,5%,.22W	909000136
L5	INDUCTOR ENCAPSULATED 100UH NON	909000103
L6	INDUCTOR,FXD,1000UF,5%,1/4W	909000155
L7	INDUCTOR,FXD,1000UF,5%,1/4W	909000155
L8	INDUCTOR,FXD,150MH,5%	909000185
L9	INDUCTOR ENCAPSULATED 100UH NON	909000103
Q1	TRANSISTOR,SI,2N3904,NPN	910303904
Q2	TRANSISTOR,SI,2N3904,NPN	910303904
Q3	TRANSISTOR,SI,2N3906,PNP	910303906
Q4	TRANSISTOR,SI,2N3906,PNP	910303906
Q5	TRANSISTOR,SI,2N3904,NPN	910303904
Q6	TRANSISTOR,SI,2N3904,NPN	910303904
Q7	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
Q9	TRANSISTOR,SI,2N3904,NPN	910303904
Q10	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
Q11	TRANSISTOR,SI,PN4258/2N4258,NPN	910304258
Q12	TRANSISTOR,SI,2N3904,NPN	910303904
R1	RESISTOR,MET FILM 51.1 OHM 1% 1/8W	907351R10
R2	RESISTOR MET FILM 5.11K OHM 1% 1/8W	907305111
R3	RESISTOR,FILM,METAL,27.4K OHM,1/8W,1%	907302742
R4	RESISTOR,FILM,METAL,27.4K OHM,1/8W,1%	907302742
R5	RESISTOR MET FILM 7.50K OHM 1% 1/8W	907307501
R6	RESISTOR MET FILM 6.04K OHM 1% 1/8W	907306041
R7	RESISTOR MET FILM 5.36K OHM 1% 1/8W	907305361
R8	RESISTOR MET FILM 6.04K OHM 1% 1/8W	907306041
R9	RESISTOR,3.92K OHM,1%,1/8W	907303921
R10	RESISTOR,MET,4.64K OHM,1%,1/8W	907304641
R11	RESISTOR,MET,4.64K OHM,1%,1/8W	907304641
R12	RESISTOR MET FILM 4.87K OHM 1% 1/8W	907304871
R13	RESISTOR MET FILM 4.87K OHM 1% 1/8W	907304871
R14	RESISTOR,FXD,FILM 4.02K OHM 1/8W 1%	907304021

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REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	–	SEE SHEET 1		

PART OF P1
2 TO ERROR DET SIG IN JACK FRONT PANEL
1
4 TO REC FAULT LINE IN JACK FRONT PANEL.
3
6
5

PART OF P2
9
6
4 SIDE 2 { OUT BI / IN UNI
5
3 RPTR SUPPLY
1 SIDE 2 { IN BI / OUT UNI
2
11 SIDE 1 OUT
10
8 SIDE 1 IN
7

IDLE SIG — PART OF P3 3 — TP1 — C39 0.1 — R126 453 — C56 560PF — R128 4120 — +5V — R127 1620 — R131 221 — Q6 2N3904 — TP2 — C43 0.1 — R81 49.9 — E4 — COAX — E5 — R129 294 — L7 1MH

S4A: 8 9 10 11 12 7 2 3 4 5 6 1
S4B: 8 9 10 11 12 7 2 3 4 5 6 1
S4C: 8 9 10 11 12 7 2 3 4 5 6 1

C68 3.3pf — C67 1pf — C66 2.7pf

R120 49.9 — R121 49.9 — R122 49.9 — R135 432 — R115 432 — R133 432 — R117 49.9 — R134 432 — R123 49.9 — R132 432 — R136 432

R119 887

T4 — L5 100MH — C64
T3 — L6 100MH — R116 100 — C65 1pf
T2 — L2 100MH
T1 — L1 100MH

+5V — S3B 7 8 9 10 — R68 1.21K — R70 1.21K — R72 1.82K — R66 2.43K — C45 33PF — Y1 — C47 33PF — Y3 — Q7 2N4258 — Q10 2N4258 — Q11 2N4258 — C44 0.1 — R67 2.43K — R71 432

R73 1.0K

U4 (J Q CK CLR K Q)

U5 1 15 4 2 8 6 16 5 3 7

U6 (J Q CK CLR K Q) — U7B — U7A — U7C — U7D — INTF $\overline{CLR}$ — PART OF P3 13

R74 2.94K — CR1 1N4148 — +15V — R137 91 — C42 .1

R75 12.1K — R76 12.1K — R77 2.94K — CR2 1N4148

C48 0.1 — L3 68 — L4 68 — R78 604 — C50 100PF — C51 C52 220PF 100PF — R80 825

R79 2.15K — R96 1.0K 2N 3904 — Q9 — Q12 2N3904 — E3 COAX — C53 — E2 — R97 374 — L6 1MH

R58 5.11K — +5V — R59 15K — C49 0.1 — R57 100K — Q5 2N3904 — -15V

E1 — S2A CW — 6 5 4 3 2 1 12 11 10 9 8 7

R84 90.9 — R85 90.9 — R86 82.5 — R87 76.8 — R88 69.8 — R89 63.4 — R90 57.6 — R91 51.1 — R92 46.4 — R93 41.2 — R94 324

R130 221 — CW R99 — R100 — CW R98 — S1B 12 11 — 500 (3)

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE

LIST OF MATERIAL OR PARTS LIST

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

√ FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.
DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED

BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION	±	

FINISH:

Sierra — LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025 — CODE IDENT. NO. 54778

SCHEMATIC DIAGRAM – A6 BOARD REPEATER TESTER

DATE 5/16/77 — BY — CHECKED — APPD

SIZE D — DRAWING NO. D03230400 — REV

SCALE — STOCK AS — SHEET 2 OF 2

DWG NO. D03230400

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
–	–	415A-4	

APPLICATION

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
R15	RESISTOR MET FILM 8.06K OHM 1% 1/8W	907308061
R16	RESISTOR,FILM,METAL,27.4K OHM,1/8W,1%	907302742
R17	RESISTOR,FILM,METAL,27.4K OHM,1/8W,1%	907302742
R18	RESISTOR,MET,5.90K OHM,1%,1/8W	907305901
R19	RESISTOR,MET,5.90K OHM,1%,1/8W	907305901
R20	RESISTOR,FILM,METAL,5.49K OHM,1/8W,1%	907305491
R21	RESISTOR,MET,4.64K OHM,1%,1/8W	907304641
R22	RESISTOR,FXD,FILM 6.19K OHM 1/8W 1%	907306191
R23	RESISTOR MET FILM 3.32K OHM 1% 1/8W	907303321
R24	RESISTOR MET FILM 3.74K OHM 1% 1/8W	907303741
R25	RESISTOR MET FILM 6.81K OHM 1% 1/8W	907306811
R26	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R27	RESISTOR,FILM,METAL,4.99K OHM,1/8W,1%	907304991
R28	RESISTOR MET FILM 8.66K OHM 1% 1/8W	907308661
R29	RESISTOR,FILM,METAL,8.87K OHM,1/8W,1%	907308871
R30	RESISTOR MET FILM 7.15K OHM 1% 1/8W	907307151
R31	RESISTOR,MET,4.12K OHM,1%,108W	907304121
R32	RESISTOR MET FILM 6.65K OHM 1% 1/8W	907306651
R33	RESISTOR,MET FILM 3.09K OHM,1/8W,1%	907303091
R34	RESISTOR MET FILM 2.94K OHM 1% 1/8W	907302941
R35	RESISTOR MET FILM 4.75K OHM 1% 1/8W	907304751
R36	RESISTOR MET FILM 3.16K OHM 1% 1/8W	907303161
R37	RESISTOR MET FILM 3.48K OHM 1% 1/8W	907303481
R38	RESISTOR MET FILM 8.06K OHM 1% 1/8W	907308061
R39	RESISTOR MET FILM 5.62 OHM 1% 1/8W	907305621
R40	RESISTOR,MET,2.26K OHM,1%,1/8W	907302261
R41	RESISTOR MET FILM 2.15K OHM 1% 1/8W	907302151
R42	RESISTOR,FXD,FILM 1.82K OHM 1/8W 1%	907301821
R43	RESISTOR,MET,1.37K OHM,1%,1/8W	907301371
R44	RESISTOR,MET,953 OHM,1%,1/8W	907309530
R45	RESISTOR,MET,931 OHM,1%,1/8W	907309310
R46	RESISTOR MET FILM 825 OHM 1% 1/8W	907308250
R47	RESISTOR MET FILM 5.11K OHM 1% 1/8W	907305111
R48	RESISTOR,FXD,FILM 100 OHM 1/8W 1%	907301000
R49	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R50	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R51	RESISTOR MET FILM 221 OHM 1% 1/8W	907302210
R52	RESISTOR MET FILM 10 OHM 1% 1/8W	907310100
R53	RESISTOR MET FILM 10 OHM 1% 1/8W	907310100
R54	RESISTOR MET FILM 221 OHM 1% 1/8W	907302210
R55	RESISTOR MET FILM 5.11K OHM 1% 1/8W	907305111
R56	RESISTOR,MET FILM,49.9 OHM,1%,1/8W	907300500
R57	RESISTOR MET FILM 100K OHM 1% 1/8W	907301003
R58	RESISTOR MET FILM 5.11K OHM 1% 1/8W	907305111
R59	RESISTOR,FXD,FILM 15.0K OHM 1/8W 1%	907301502
R66	RESISTOR,FAX,FILM 2.43K OHM,1/8W 1%	907302431
R67	RESISTOR,FAX,FILM 2.43K OHM,1/8W 1%	907302431
R68	RESISTOR,METAL,FILM,1.21K OHM,1/8W,1%	907301211
R70	RESISTOR,METAL,FILM,1.21K OHM,1/8W,1%	907301211
R71	RESISTOR,FXD,FILM 432 OHM 1/8W 1%	907304320

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
R72	RESISTOR,FXD,FILM 1.82K OHM 1/8W 1%	907301821
R73	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R74	RESISTOR MET FILM 2.94K OHM 1% 1/8W	907302941
R75	RESISTOR MET FILM 12.1K OHM 1% 1/8W	907301212
R76	RESISTOR MET FILM 12.1K OHM 1% 1/8W	907301212
R77	RESISTOR MET FILM 2.94K OHM 1% 1/8W	907302941
R78	RESISTOR,FILM,METAL,604 OHM,1/8W,1%	907306040
R79	RESISTOR MET FILM 2.15K OHM 1% 1/8W	907302151
R80	RESISTOR MET FILM 825 OHM 1% 1/8W	907308250
R81	RESISTOR,MET FILM,49.9 OHM,1%,1/8W	907300500
R82	RESISTOR,MET FILM,1.33K OHM,1%,1/8W	907301331
R83	RESISTOR,MET FILM,1.13K OHM 1%,1/8W	907301131
R84	RESISTOR MET FILM 90.9 OHM 1% 1/8W	907390R90
R85	RESISTOR MET FILM 90.9 OHM 1% 1/8W	907390R90
R86	RESISTOR MET FILM 82.5 OHM 1% 1/8W	907382R50
R87	RESISTOR,MET FILM,76.8 OHM,1%,1/8W	907376R80
R88	RESISTOR MET FILM 69.8 OHM 1% 1/8W	907369R80
R89	RESISTOR,MET FILM,63.4 OHM ,1%,1/8W	907363R40
R90	RESISTOR,MET FILM,5.6 OHM,1%,1/8W	907357R60
R91	RESISTOR,MET FILM 51.1 OHM 1% 1/8W	907351R10
R92	RESISTOR MET FILM 41.2 OHM 1% 1/8W	907346R40
R93	RESISTOR MET FILM 41.2 OHM 1% 1/8W	907341R20
R94	RESISTOR MET FILM 324 OHM 1% 1/8W	907303240
R95	RESISTOR MET FILM 5.11K OHM 1% 1/8W	907305111
R96	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R97	RESISTOR,MET FILM 374 OHM 1/8W,1%	907303740
R98	POT,500OHM,10D%,15 TURN	907900315
R99	POT,500OHM,10D%,15 TURN	907900315
R100	POT,500OHM,10D%,15 TURN	907900315
R101	RESISTOR COMP 91 OHM 5% 1/4W	906900910
R102	RESISTOR COMP 91 OHM 5% 1/4W	906900910
R103	RESISTOR COMP 91 OHM 5% 1/4W	906900910
R115	RESISTOR,FXD,FILM 432 OHM 1/8W 1%	907304320
R116	RESISTOR,FXD,FILM 100 OHM 1/8W 1%	907301000
R117	RESISTOR,MET FILM,49.9 OHM,1%,1/8W	907300500
R119	RESISTOR,MET FILM,887 OHM 1% 1/8W	907308870
R120	RESISTOR,MET FILM,49.9 OHM,1%,1/8W	907300500
R121	RESISTOR,MET FILM,49.9 OHM,1%,1/8W	907300500
R122	RESISTOR,MET FILM,49.9 OHM,1%,1/8W	907300500
R123	RESISTOR,MET FILM,49.9 OHM,1%,1/8W	907300500
R124	POT,10K,10%,15 TURN	907900281
R125	RESISTOR,MET FILM 51.1 OHM 1% 1/8W	907351R10
R126	RESISTOR,453 OHM,1%,1/8W	907304530
R127	RESISTOR,MET FILM,1.62K OHM 1% 1/8W	907301621
R128	RESISTOR,MET,4.12K OHM,1%,108W	907304121
R129	RESISTOR,MET FILM,294 OHM,1%,1/8W	907302940
R130	RESISTOR MET FILM 221 OHM 1% 1/8W	907302210
R131	RESISTOR MET FILM 221 OHM 1% 1/8W	907302210
R132	RESISTOR,FXD,FILM 432 OHM 1/8W 1%	907304320
R133	RESISTOR,FXD,FILM 432 OHM 1/8W 1%	907304320
R134	RESISTOR,FXD,FILM 432 OHM 1/8W 1%	907304320

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
R135	RESISTOR,FXD,FILM 432 OHM 1/8W 1%	907304320
R136	RESISTOR,FXD,FILM 432 OHM 1/8W 1%	907304320
R137	RESISTOR COMP 91 OHM 5% 1/4W	906900910
R138	RESISTOR MET FILM 100K OHM 1% 1/8W	907301003
S1	SWITCH,ROTARY,S1-A6	911200286
S2	SWITCH,ROTARY,S2-A6	911200268
S3	SWITCH,ROTARY,S3-A6	911200269
S4	SWITCH,ROTARY,S4-A6	911200285
T1	TRANSFORMER TOROIDAL 6MH 20% CTI TO ICT	909300013
T2	TRANSFORMER TOROIDAL 6MH 20% CTI TO ICT	909300013
T3	TRANSFORMER TOROIDAL 6MH 20% CTI TO ICT	909300013
T4	TRANSFORMER TOROIDAL 6MH 20% CTI TO ICT	909300013
T5	TRANSFORMER TOROIDAL 6MH 20% CTI TO ICT	909300013
U1	IC,LM318N,OPERATIONAL AMP	920310318
U2	IC,LM318N,OPERATIONAL AMP	920310318
U3	IC,LM318N,OPERATIONAL AMP	920310318
U4	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U5	IC,CA3127E,TRANSISTOR ARRAY,NPN	920303127
U6	IC,SN74LS75N,DUAL J-K FLIP-FLOP	920317473
U7	INTEGRATED CIRCUIT,SN74LS02N	920337402
XY1	CLIP,CRYSTAL,HOLDING STEEL	921100004
XY3	CLIP,CRYSTAL,HOLDING STEEL	921100004
Y1	CRYSTAL, 4.620 MHZ	912200195
Y3	CRYSTAL, 9.420 MHZ	912200197

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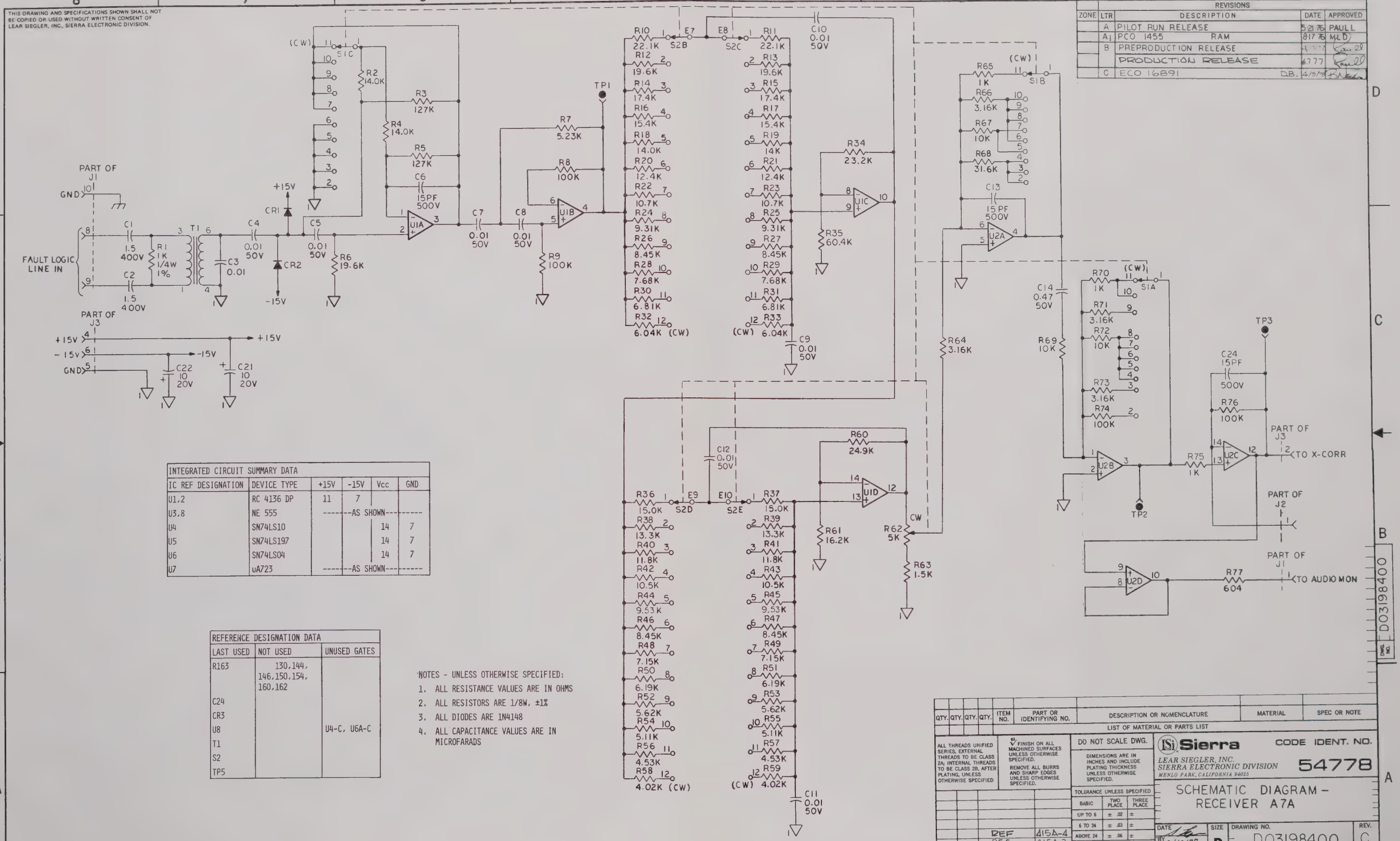
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE	5 2 76	PAULL
	A1	PCO 1455 RAM	8 17 76	MLD
	B	PREPRODUCTION RELEASE	4 [illegible] 77	[illegible]
		PRODUCTION RELEASE	6 7 77	[illegible]
	C	ECO 16891 DB.	4/5/78	[illegible]



INTEGRATED CIRCUIT SUMMARY DATA					
IC REF DESIGNATION	DEVICE TYPE	+15V	-15V	Vcc	GND
U1,2	RC 4136 DP	11	7		
U3,8	NE 555	------AS SHOWN------			
U4	SN74LS10			14	7
U5	SN74LS197			14	7
U6	SN74LS04			14	7
U7	uA723	------AS SHOWN------			

REFERENCE DESIGNATION DATA		
LAST USED	NOT USED	UNUSED GATES
R163	130,144, 146,150,154, 160,162	
C24		
CR3		
U8		U4-C, U6A-C
T1		
S2		
TP5		

NOTES - UNLESS OTHERWISE SPECIFIED:
1. ALL RESISTANCE VALUES ARE IN OHMS
2. ALL RESISTORS ARE 1/8W, ±1%
3. ALL DIODES ARE 1N4148
4. ALL CAPACITANCE VALUES ARE IN MICROFARADS

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED. REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG. DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
APPLICATION		REF	415A-4
		REF	415A-2

Sierra — LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025 — CODE IDENT. NO. 54778

SCHEMATIC DIAGRAM - RECEIVER A7A

DATE	SIZE	DRAWING NO.	REV.
BY 2/10/77	D	D03198400	C
CHECKED [illegible] 4-7-77	SCALE	STOCK AS	SHEET 1 OF 2
APPR			

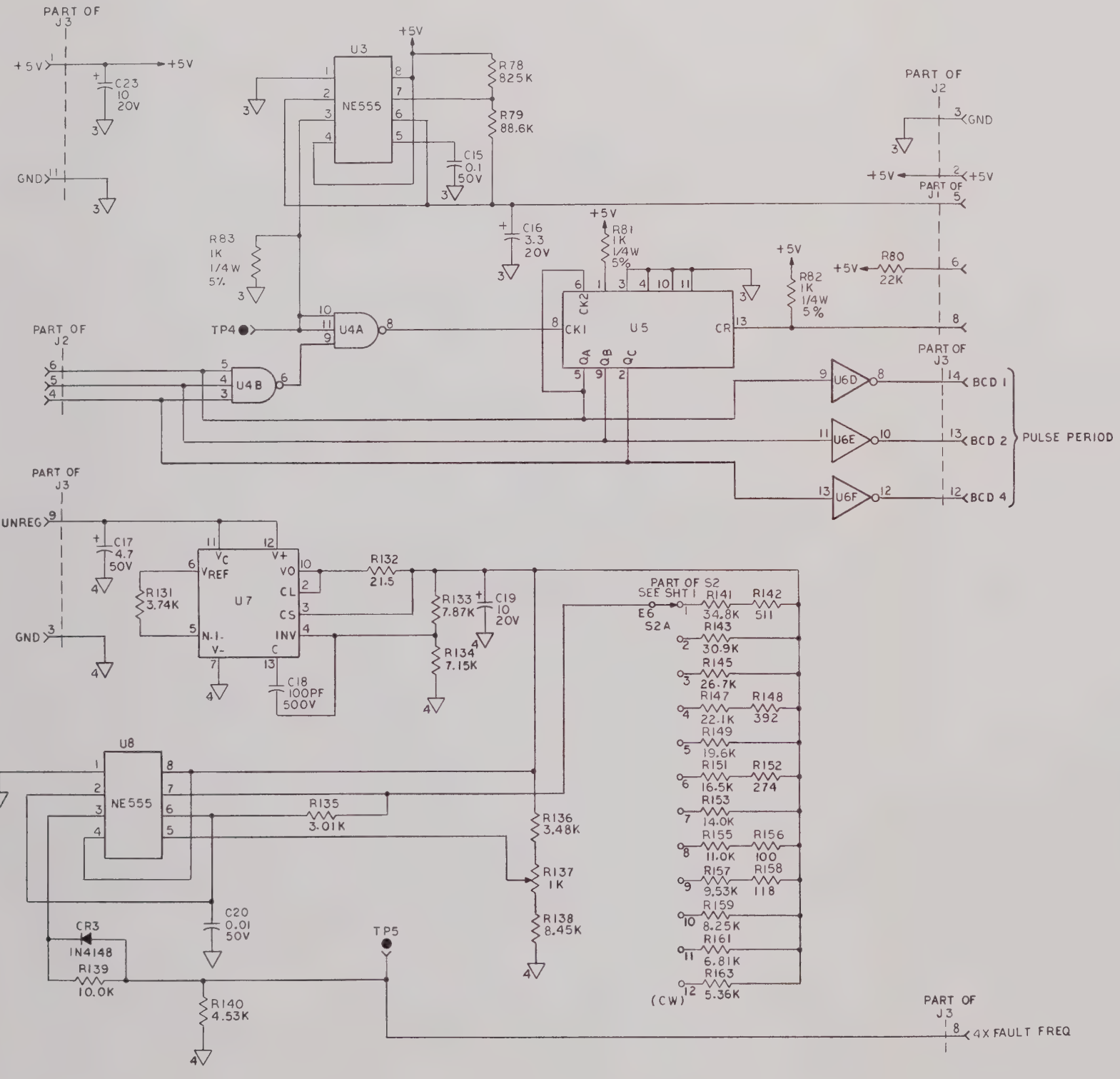
DWG. NO. D03198400

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
A7A	PWB ASSY, A7A, 415A-2, -4	D03198400
C1	CAPACITOR,MET MYLAR 1.5MF 10% 400V	901100155
C2	CAPACITOR,MET MYLAR 1.5MF 10% 400V	901100155
C3	CAPACITOR,CERAMIC .01MF 10% 200V	901330103
C4	CAPACITOR,POLYCARBONATE .010MF 2% 50VDC	903100103
C5	CAPACITOR,POLYCARBONATE .010MF 2% 50VDC	903100103
C6	CAPACITOR,DIPPED MICA 15PF 5% 500V	901900150
C7	CAPACITOR,POLYCARBONATE .010MF 2% 50VDC	903100103
C8	CAPACITOR,POLYCARBONATE .010MF 2% 50VDC	903100103
C9	CAPACITOR,DIPPED MICA 15PF 5% 500V	901900150
C10	CAPACITOR,DIPPED MICA 15PF 5% 500V	901900150
C11	CAPACITOR,DIPPED MICA 15PF 5% 500V	901900150
C12	CAPACITOR,DIPPED MICA 15PF 5% 500V	901900150
C13	CAPACITOR,DIPPED MICA 15PF 5% 500V	901900150
C14	CAPACITOR,CERAMIC 0.47MF,20%,50V	901300474
C15	CAPACITOR,CERAMIC 0.1MF,20%,50V	901300104
C16	CAPACITOR,TANTALUM 3.3 MF 10% 20V MIN	902710335
C17	CAPACITOR,TANTALUM 4.7MF 10% 50 VDCW	902700475
C18	CAPACITOR DIPPED MICA 100PF,5%,500V	901900101
C19	CAPACITOR,DIPPED TANTLEX 10MF 20% 20VDC	902710106
C20	CAPACITOR,POLYCARBONATE .010MF 2% 50VDC	903100103
C21	CAPACITOR,DIPPED TANTLEX 10MF 20% 20VDC	902710106
C22	CAPACITOR,DIPPED TANTLEX 10MF 20% 20VDC	902710106
C23	CAPACITOR,DIPPED TANTLEX 10MF 20% 20VDC	902710106
C24	CAPACITOR,DIPPED MICA 15PF 5% 500V	901900150
CR1	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR2	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR3	DIODE,SI,IN4148,75V,150MA,500MW	910504148
J1	CONNECTOR PC MTG WAFER ASSEMBLY POLARIZING	914800193
J2	FLEXSTRIP 6 PIN	916400077
J3	SOCKET,DIP 14 PIN	914200086
R1	RESISTOR,MET FILM 1.00K 1% 1/4W 25 PPM	908351001
R2	RESISTOR MET FILM 14.0K OHM 1% 1/8W	907301402
R3	RESISTOR MET FILM 127K OHM 1% 1/8W	907301273
R4	RESISTOR MET FILM 14.0K OHM 1% 1/8W	907301402
R5	RESISTOR MET FILM 127K OHM 1% 1/8W	907301273
R6	RESISTOR MET FILM 19.6K OHM 1% 1/8W	907301962
R7	RESISTOR MET FILM 5.23K OHM 1% 1/8W	907305231
R8	RESISTOR MET FILM 100K OHM 1% 1/8W	907301003
R9	RESISTOR MET FILM 100K OHM 1% 1/8W	907301003
R10	RESISTOR MET FILM 22.1K OHM 1% 1/8W	907302212
R11	RESISTOR MET FILM 22.1K OHM 1% 1/8W	907302212
R12	RESISTOR MET FILM 19.6K OHM 1% 1/8W	907301962
R13	RESISTOR MET FILM 19.6K OHM 1% 1/8W	907301962
R14	RESISTOR MET FILM 17.4K OHM 1% 1/8W	907301742
R15	RESISTOR MET FILM 17.4K OHM 1% 1/8W	907301742
R16	RESISTOR MET FILM 15.4K OHM 1% 1/8W	907301542
R17	RESISTOR MET FILM 15.4K OHM 1% 1/8W	907301542
R18	RESISTOR MET FILM 14.0K OHM 1% 1/8W	907301402
R19	RESISTOR MET FILM 127K OHM 1% 1/8W	907301273
R20	RESISTOR MET FILM 12.4K OHM 1% 1/8W	907301242

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
R21	RESISTOR MET FILM 12.4K OHM 1% 1/8W	907301242
R22	RESISTOR MET FILM 10.7K OHM 1% 1/8W	907301072
R23	RESISTOR MET FILM 10.7K OHM 1% 1/8W	907301072
R24	RESISTOR MET FILM 9.31K OHM 1% 1/8W	907309311
R25	RESISTOR MET FILM 9.31K OHM 1% 1/8W	907309311
R26	RESISTOR MET FILM 8.45K OHM 1% 1/8W	907308451
R27	RESISTOR MET FILM 8.45K OHM 1% 1/8W	907308451
R28	RESISTOR MET FILM 7.68K OHM 1% 1/8W	907307681
R29	RESISTOR MET FILM 7.68K OHM 1% 1/8W	907307681
R30	RESISTOR MET FILM 6.81K OHM 1% 1/8W	907306811
R31	RESISTOR MET FILM 6.81K OHM 1% 1/8W	907306811
R32	RESISTOR MET FILM 6.04K OHM 1% 1/8W	907306041
R33	RESISTOR MET FILM 6.04K OHM 1% 1/8W	907306041
R34	RESISTOR MET FILM 23.2K OHM 1% 1/8W	907302322
R35	RESISTOR MET FILM 60.4K OHM 1% 1/8W	907306042
R36	RESISTOR,FXD,FILM 15.0K OHM 1/8W 1%	907301502
R37	RESISTOR,FXD,FILM 15.0K OHM 1/8W 1%	907301502
R38	RESISTOR MET FILM 13.3K OHM 1% 1/8W	907301332
R39	RESISTOR MET FILM 13.3K OHM 1% 1/8W	907301332
R40	RESISTOR MET FILM 11.8K OHM 1% 1/8W	907301182
R41	RESISTOR MET FILM 11.8K OHM 1% 1/8W	907301182
R42	RESISTOR MET FILM 10.5K OHM 1% 1/8W	907301052
R43	RESISTOR MET FILM 10.5K OHM 1% 1/8W	907301052
R44	RESISTOR MET FILM 9.53K OHM 1% 1/8W	907309531
R45	RESISTOR MET FILM 9.53K OHM 1% 1/8W	907309531
R46	RESISTOR MET FILM 7.68K OHM 1% 1/8W	907307681
R47	RESISTOR MET FILM 7.68K OHM 1% 1/8W	907307681
R48	RESISTOR MET FILM 7.15K OHM 1% 1/8W	907307151
R49	RESISTOR MET FILM 7.15K OHM 1% 1/8W	907307151
R50	RESISTOR,FXD,FILM 6.19K OHM 1/8W 1%	907306191
R51	RESISTOR,FXD,FILM 6.19K OHM 1/8W 1%	907306191
R52	RESISTOR MET FILM 5.62 OHM 1% 1/8W	907305621
R53	RESISTOR MET FILM 5.62 OHM 1% 1/8W	907305621
R54	RESISTOR MET FILM 5.11K OHM 1% 1/8W	907305111
R55	RESISTOR MET FILM 5.11K OHM 1% 1/8W	907305111
R56	RESISTOR,MET FILM 45.8K 1% 1/8W	907304581
R57	RESISTOR,MET FILM 45.8K 1% 1/8W	907304581
R58	RESISTOR,FXD,FILM 4.02K OHM 1/8W 1%	907304021
R59	RESISTOR,FXD,FILM 4.02K OHM 1/8W 1%	907304021
R60	RESISTOR MET FILM 24.9K OHM 1% 1/8W	907302492
R61	RESISTOR MET FILM 16.2K OHM 1% 1/8W	907301622
R63	RESISTOR,FILM,METAL,1.50K OHM,100W,1%	907301501
R64	RESISTOR MET FILM 3.16K OHM 1% 1/8W	907303161
R65	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R66	RESISTOR MET FILM 3.16K OHM 1% 1/8W	907303161
R67	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R68	RESISTOR MET FILM 31.6K OHM 1% 1/8W	907303162
R69	RESISTOR,FXD,FILM 10K OHM 1/8W 1%	907301002
R70	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R71	RESISTOR MET FILM 3.16K OHM 1% 1/8W	907303161
R72	RESISTOR MET FILM 31.6K OHM 1% 1/8W	907303162

THIS DRAWING AND SPECIFICATIONS SHOWN SHALL NOT BE COPIED OR USED WITHOUT WRITTEN CONSENT OF LEAR SIEGLER, INC., SIERRA ELECTRONIC DIVISION.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		



QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A, INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.

DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		
FINISH:		

Sierra — CODE IDENT. NO. 54778
LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION
MENLO PARK, CALIFORNIA 94025

SCHEMATIC DIAGRAM— RECEIVER A7A

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
APPLICATION		REF	415A-2

DATE 2/10/77 | BY | CHECKED Jacobs 4-7-77 | APPR

SIZE	DRAWING NO.	REV.
D	D03198400	C

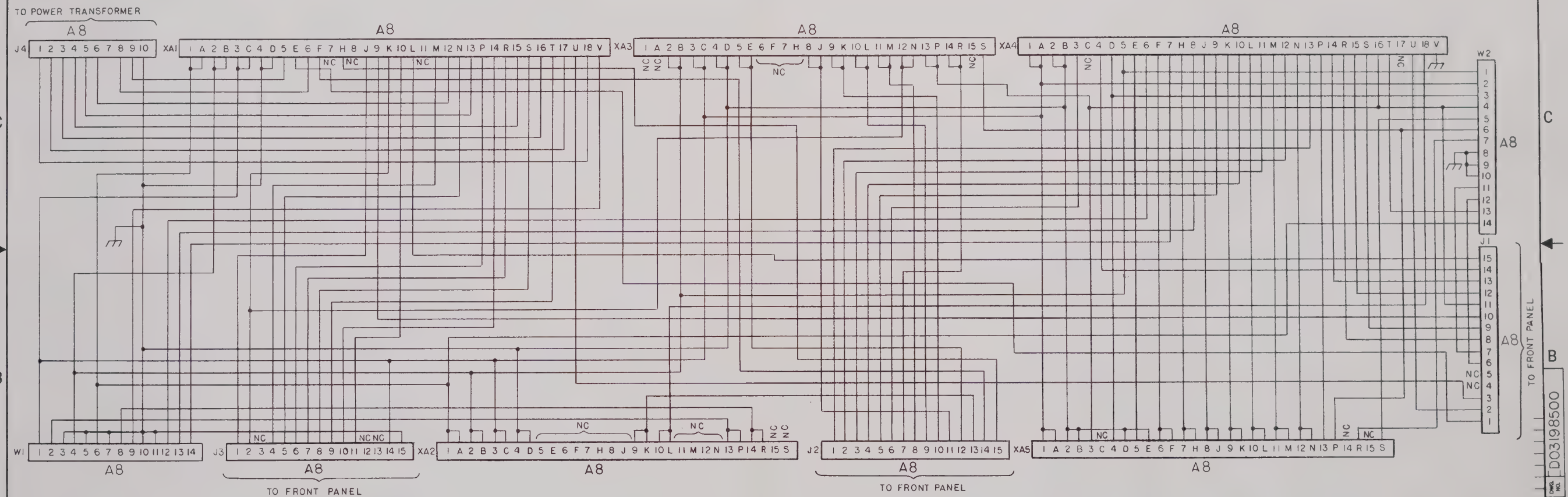
SCALE | STOCK AS | SHEET 2 OF 2

DWG. NO. D03198400

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
R73	RESISTOR MET FILM 31.6K OHM 1% 1/8W	907303162
R74	RESISTOR MET FILM 100K OHM 1% 1/8W	907301003
R75	RESISTOR,FXD,FILM 1.0K OHM 1/8W 1%	907301001
R76	RESISTOR MET FILM 100K OHM 1% 1/8W	907301003
R77	RESISTOR,FILM,METAL,604 OHM,1/8W,1%	907306040
R78	RESISTOR MET FILM 825K OHM 1% 1/8W	907308253
R79	RESISTOR MET FILM 86.6K OHM 1% 1/8W	907308662
R80	RESISTOR,FXD,COMP,22K OHM 1/4W 5%	906900223
R81	RESISTOR,FXD,COMP 1K OHM 1/4W 5%	906900102
R82	RESISTOR,FXD,COMP 1K OHM 1/4W 5%	906900102
R83	RESISTOR,FXD,COMP 1K OHM 1/4W 5%	906900102
R131	RESISTOR MET FILM 3.74K OHM 1% 1/8W	907303741
R132	RESISTOR MET FILM 21.5 OHM 1% 1/8W	907321R50
R133	RESISTOR MET FILM 7.87K OHM 1% 1/8W	907307871
R134	RESISTOR MET FILM 7.15K OHM 1% 1/8W	907307151
R135	RESISTOR,FXD,FILM 3.01K OHM 1/8W 1%	907303011
R136	RESISTOR MET FILM 3.48K OHM 1% 1/8W	907303481
R137	POTENTIOMETER 1K 10% 15 TURN PC MTG	907900290
R138	RESISTOR MET FILM 7.68K OHM 1% 1/8W	907307681
R139	RESISTOR MET FILM 31.6K OHM 1% 1/8W	907303162
R140	RESISTOR,MET FILM 45.8K 1% 1/8W	907304581
R141	RESISTOR MET FILM 34.8K OHM 1% 1/8W	907303482
R142	RESISTOR MET FILM 511 OHM 1% 1/8W	907305110
R143	RESISTOR MET FILM 30.9K OHM 1% 1/8W	907303092
R145	RESISTOR MET FILM 26.7K OHM 1% 1/8W	907302672
R147	RESISTOR MET FILM 22.1K OHM 1% 1/8W	907302212
R148	RESISTOR MET FILM 392 OHM 1% 1/8W	907303920
R149	RESISTOR MET FILM 19.6K OHM 1% 1/8W	907301962
R151	RESISTOR MET FILM 16.5K OHM 1% 1/8W	907301652
R152	RESISTOR MET FILM 274 OHM 1% 1/8W	907302740
R153	RESISTOR MET FILM 127K OHM 1% 1/8W	907301273
R155	RESISTOR MET FILM 11.0K OHM 1% 1/8W	907301102
R156	RESISTOR,FXD,FILM 100 OHM 1/8W 1%	907301000
R157	RESISTOR MET FILM 9.53K OHM 1% 1/8W	907309531
R158	RESISTOR MET FILM 118 OHM 1% 1/8W	907301180
R159	RESISTOR COMP 8.25K OHM 1% 1/8W	907308251
R161	RESISTOR MET FILM 6.81K OHM 1% 1/8W	907306811
R163	RESISTOR MET FILM 5.36K OHM 1% 1/8W	907305361
S1	SWITCH,ROTARY 10 POS 3 SEC,WITH 5K POT	911200277
S2	SWITCH,ROTARY 12 POS 1 POLE 5SEC 30 DEGREE	911200276
T1	TRANSFORMER 600 CT 600 CT	909900037
U1	IC,RCA136,QUAD OPERATIONAL AMP	920304136
U2	IC,RCA136,QUAD OPERATIONAL AMP	920304136
U3	IC,LM555CN,TIMER	920300555
U4	IC,SN74LS10N,TRIPLE 3 INPUT NAND GATE	920327410
U5	IC,SN74LS197N,BINARY COUNTER/LATCH	920374197
U6	IC,SN74LS04N,HEX INVERTER	920327404
U7	IC,LM723CD,VOLTAGE REGULATOR	920300723
U8	IC,LM555CN,TIMER	920300555

THIS DRAWING AND SPECIFICATIONS SHOWN SHALL NOT BE COPIED OR USED WITHOUT WRITTEN CONSENT OF LEAR SIEGLER, INC., SIERRA ELECTRONIC DIVISION.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE	5-21-76	PAULL
	A2	PCO 1382, 1383 RAM	8-17-76	MLD
	A3	PCO 1880		
	B	PREPRODUCTION RELEASE	4	
		PRODUCTION RELEASE	6 7 77	



QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.

DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
APPLICATION		415A-4 415A-11 415A-2	

Sierra
LEAR SIEGLER, INC.
SIERRA ELECTRONIC DIVISION
MENLO PARK, CALIFORNIA 94025

CODE IDENT. NO. 54778

SCHEMATIC DIAGRAM -
A8
MOTHERBOARD

DATE	SIZE	DRAWING NO.	REV.
2/26/77	D	D03198500	B

BY
CHECKED
APPR

SCALE | STOCK AS | SHEET 1 OF 1

DWG. NO. D03198500

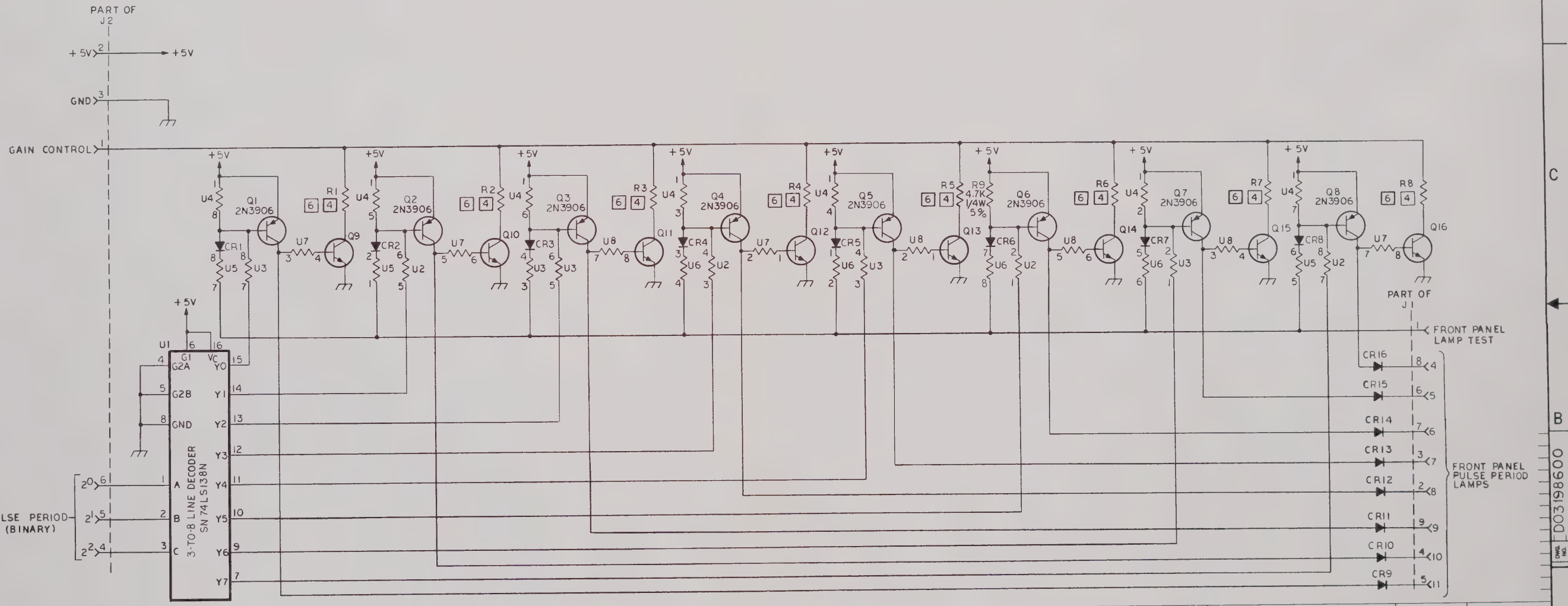
REF DESIG	DESCRIPTION	SIERRA PART NUMBER
A8	PWB ASSY, A8, 415A-2, -4	D03198500
J1	CONNECTOR PC MTG WAFER ASSEMBLY POLARIZING	914800195
J2	CONNECTOR PC MTG WAFER ASSEMBLY POLARIZING	914800195
J3	CONNECTOR PC MTG WAFER ASSEMBLY POLARIZING	914800195
J4	CONNECTOR PC MTG WAFER ASSEMBLY POLARIZING	914800193
XA1	CONNECTOR .156 CONTACT SPACING	914800234
XA2	CONNECTOR, 15/30 DIP SOLDER PWB	914800149
XA3	CONNECTOR, 15/30 DIP SOLDER PWB	914800149
XA4	CONNECTOR .156 CONTACT SPACING	914800234
XA5	CONNECTOR, 15/30 DIP SOLDER PWB	914800149

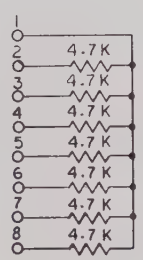
THIS DRAWING AND SPECIFICATIONS SHOWN SHALL NOT BE COPIED OR USED WITHOUT WRITTEN CONSENT OF LEAR SIEGLER, INC., SIERRA ELECTRONIC DIVISION.

NOTES - UNLESS OTHERWISE SPECIFIED:

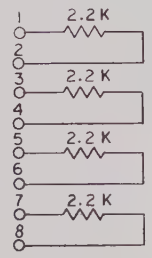
1. ALL RESISTANCE VALUES ARE IN OHMS
2. ALL RESISTORS ARE 1/8W, ±1%
3. ALL DIODES ARE 1N4148
4. [4] SEE TABLE "A"
5. ALL TRANSISTORS ARE 2N3904
6. [6] GAIN CONTROL RESISTORS FOR NON-INVERTING OP AMP

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE	5-21-76	PAULL
	A2	PCO 1452,1589 RAM	8-17-76	MLD
	B	PREPRODUCTION RELEASE	4/7/77	Paull
		PRODUCTION RELEASE	10/7/77	Paull
	B_1	ECO 16996 TC 7-2078		





U4



U2,3,5 — 8

TABLE "A"		
COMP	-11	-2,-4
R1	12.7K	12.7K
R2	14.3K	14.3K
R3	16.5K	16.2K
R4	19.6K	18.7K
R5	24.3K	22.6K
R6	30.9K	28.0K
R7	43.2K	37.4K
R8	73.2K	54.9K

REFERENCE DESIGNATION DATA	
LAST USED	NOT USED
R9	
U8	
Q16	
CR16	

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
LIST OF MATERIAL OR PARTS LIST								

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

63 √ FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.
REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.

DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
			415A-4
			415A-11
			415A-2
APPLICATION			

Sierra — CODE IDENT. NO. 54778

LEAR SIEGLER, INC.
SIERRA ELECTRONIC DIVISION
MENLO PARK, CALIFORNIA 94025

415A-2,-4,-11
A9 PULSE PERIOD GAIN COMP, LAMP DRIVER

DATE	SIZE	DRAWING NO.	REV.
2-5-77	D	D03198600	B_1

BY
CHECKED
APPR
SCALE
STOCK AS
SHEET 1 OF 1

D03198600

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
A9	PWB ASSY, A9, 415A-2, -4	D03198600
CR1	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR2	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR3	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR4	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR5	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR6	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR7	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR8	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR9	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR10	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR11	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR12	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR13	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR14	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR15	DIODE,SI,IN4148,75V,150MA,500MW	910504148
CR16	DIODE,SI,IN4148,75V,150MA,500MW	910504148
J1	CONNECTOR, MOLEX 9 PIN	914800257
Q1	TRANSISTOR,SI,2N3906,PNP	910303906
Q2	TRANSISTOR,SI,2N3906,PNP	910303906
Q3	TRANSISTOR,SI,2N3906,PNP	910303906
Q4	TRANSISTOR,SI,2N3906,PNP	910303906
Q5	TRANSISTOR,SI,2N3906,PNP	910303906
Q6	TRANSISTOR,SI,2N3906,PNP	910303906
Q7	TRANSISTOR,SI,2N3906,PNP	910303906
Q8	TRANSISTOR,SI,2N3906,PNP	910303906
Q9	TRANSISTOR,SI,2N3904,NPN	910303904
Q10	TRANSISTOR,SI,2N3904,NPN	910303904
Q11	TRANSISTOR,SI,2N3904,NPN	910303904
Q12	TRANSISTOR,SI,2N3904,NPN	910303904
Q13	TRANSISTOR,SI,2N3904,NPN	910303904
Q14	TRANSISTOR,SI,2N3904,NPN	910303904
Q15	TRANSISTOR,SI,2N3904,NPN	910303904
Q16	TRANSISTOR,SI,2N3904,NPN	910303904
R1	RESISTOR MET FILM 12.7K OHM 1% 1/8W	907301272
R2	RESISTOR MET FILM 14.3K OHM 1% 1/8W	907301432
R3	RESISTOR MET FILM 16.2K OHM 1% 1/8W	907301622
R4	RESISTOR,MET FILM 18.7K OHM 1/8W	907301872
R5	RESISTOR,MET FILM 22.6K OHM 1/8W	907302262
R6	RESISTOR,MET FILM 28.0K OHM 1/8W	907302802
R7	RESISTOR,MET FILM 37.4K OHM 1/8W	907303742
R8	RESISTOR,MET FILM 54.9K OHM 1/8W	907305492
R9	RESISTOR,FXD,COMP,4.7K OHM 1/4W 5%	906900472
U1	IC,SN74LS138N,DECODER/MULTIPLEXER	920374138
U2	RESISTOR ISOLATED NETWORK 2.2K OHM 2% 1/8W	920880222
U3	RESISTOR ISOLATED NETWORK 2.2K OHM 2% 1/8W	920880222
U4	RESISTOR,COMMON JUNCTION 4.7K OHM 1/8W	920680472
U5	RESISTOR ISOLATED NETWORK 2.2K OHM 2% 1/8W	920880222
U6	RESISTOR ISOLATED NETWORK 2.2K OHM 2% 1/8W	920880222
U7	RESISTOR ISOLATED NETWORK 2.2K OHM 2% 1/8W	920880222
U8	RESISTOR ISOLATED NETWORK 2.2K OHM 2% 1/8W	920880222

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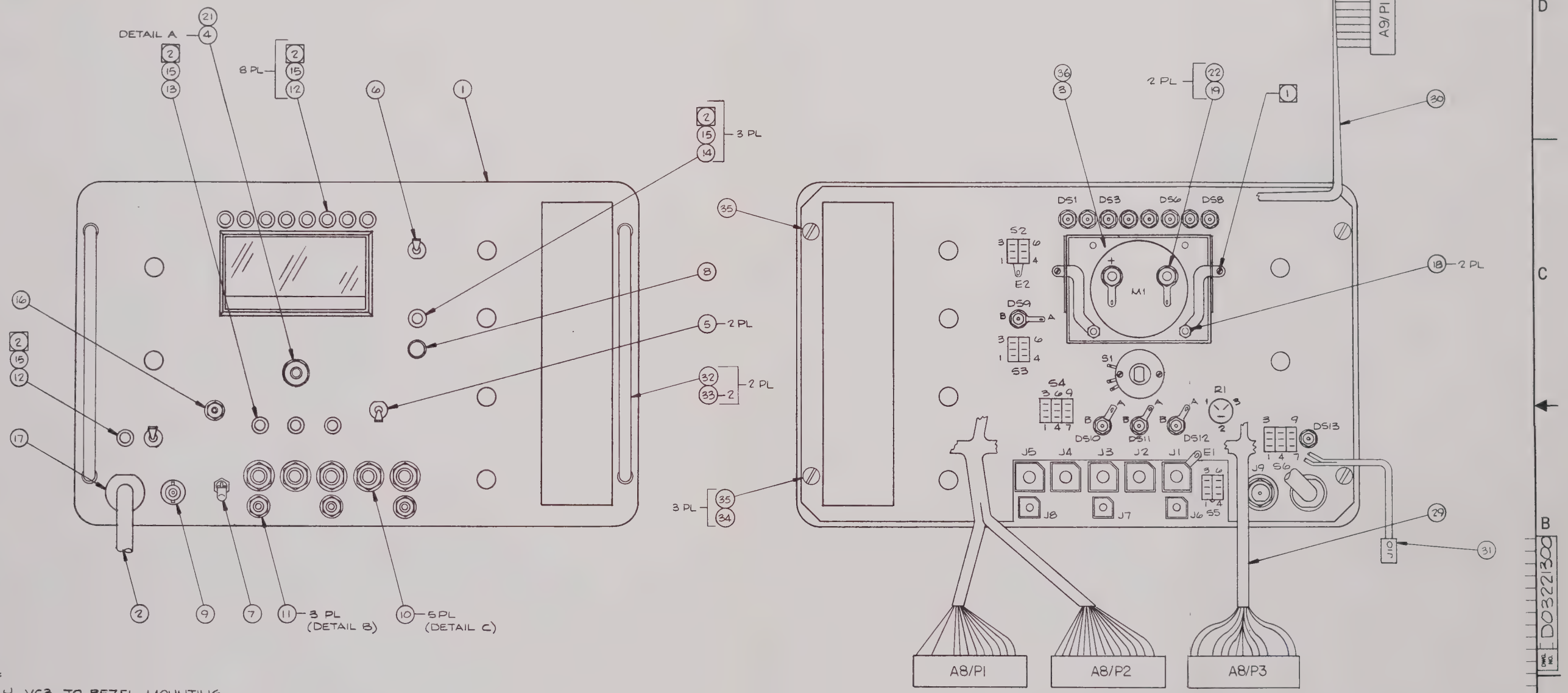
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE		
		PREPRODUCTION RELEASE	3/9/76	
	A_2	PCO 2376,2477	6/1/76	
	B	PRODUCTION RELEASE	3/30/76	



SEE A03271800 FOR L/M

NOTES:

1. APPLY VC3 TO BEZEL MOUNTING SCREWS PRIOR TO ASSY.
2. INSTALL ITEM 15 AFTER SOLDERING WIRES TO LAMPHOLDERS.

QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
					LIST OF MATERIAL OR PARTS LIST		

QTY. ASSY. OR ITEM	QTY. NEXT	NEXT ASSY.	MODEL NO.
00	REF	A03271800	415A-4
APPLICATION			

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A, INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.

REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.

DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

Sierra — CODE IDENT. NO. 94668

LEAR SIEGLER, INC.
SIERRA ELECTRONIC DIVISION
MENLO PARK, CALIFORNIA 94025

FRONT PANEL ASSY

DATE	SIZE	DRAWING NO.	REV.
6/25/76	D	D03221300	B

BY B. CARLSON
CHECKED
APPR

SCALE 1/1 | STOCK AS | SHEET 1 OF 4

DWG. NO. D03221300

REF DESIG	DESCRIPTION	SIERRA PART NUMBER
FP	ASSY,FRONT PANEL,415A-4	D03221300
DS1	LAMPHOLDER, WHITE	913800063
DS2	LAMPHOLDER, WHITE	913800063
DS3	LAMPHOLDER, WHITE	913800063
DS4	LAMPHOLDER, WHITE	913800063
DS5	LAMPHOLDER, WHITE	913800063
DS6	LAMPHOLDER, WHITE	913800063
DS7	LAMPHOLDER, WHITE	913800063
DS8	LAMPHOLDER, WHITE	913800063
DS9	LAMPHOLDER, RED	913800065
DS10	LAMPHOLDER, RED	913800065
DS11	LAMPHOLDER, RED	913800065
DS12	LAMPHOLDER, GREEN	913800064
DS13	LAMPHOLDER, WHITE	913800063
F1	FUSE, SLO-BLOW .250 AMP	913200033
FP2	POWER CORD	916400056
FP15	LAMP, INCANDESCENT TI FLANGE BASE	913800060
FP18	KNOB, SKIRTED BAR	916000142
FP19	KNOB	916000149
FP20	KNOB,RECESSED BASE POINTER	916000143
FP21	KNOB	916000148
FP36	METER BEZEL	920400038
J1	JACK,PHONE 310	914400024
J2	JACK,PHONE 310	914400024
J3	JACK,PHONE 310	914400024
J4	JACK,PHONE 310	914400024
J5	JACK,PHONE 310	914400024
J6	JACK,PHONE TT	914400036
J7	JACK,PHONE TT	914400036
J8	JACK,PHONE TT	914400036
J9	JACK,BNC	914600035
M1	METER	911800160
R1	POT,25K OHM	907900376
S1	SWITCH,ROTARY	911200263
S2	SWITCH,TOGGLE	911000087
S3	SWITCH,PUSHBUTTON DPDT	911300061
S4	SWITCH,TOGGLE 3PDT	911000086
S5	SWITCH,TOGGLE DPDT	911000057
S6	SWITCH,TOGGLE 3PDT	911000086
S7	SWITCH,SLIDE DPDT	911000040
T1	TRANSFORMER ASSY	C03181900
XF1	FUSE HOLDER	913400012

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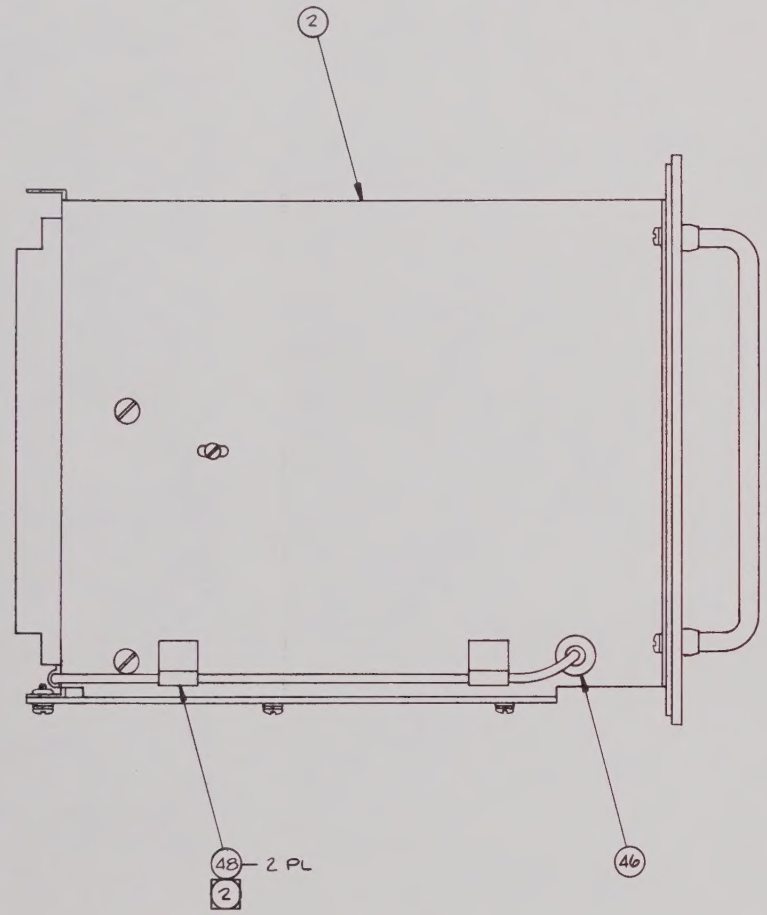
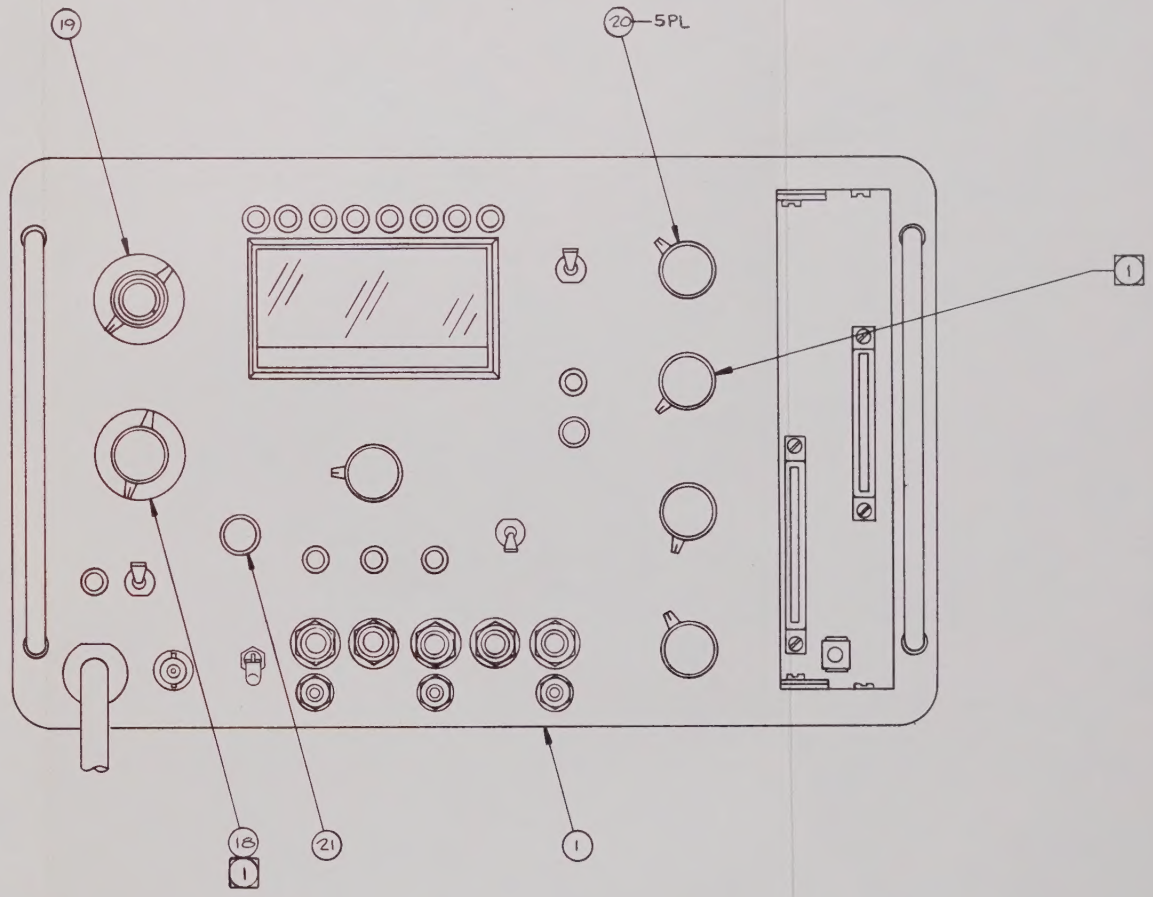
ZONE	LTR	REVISIONS DESCRIPTION	DATE	APPROVED
	A	PILOT RUN RELEASE		
	A4	PCO 1562, 1621, 1957, 1958	9/8/77	
	B	PRE-PRODUCTION RELEASE	9/9/77	
	B_1	PCO 2476	3/27/78	
	C	PRODUCTION RELEASE	3/30/78	M Dixon





SEE A03271700 FOR L/M

NOTES:

1. EXACT ALIGNMENT OF KNOB TO BE DONE DURING THE TEST PROCEDURE.
2. LOCATE ITEM 48 APPROX. AS SHOWN.
3. AFTER TIGHTENING ITEM 43 (NUT) LOOSEN NUT 1/4 TO 1 TURN TO ALLOW THE CONNECTOR TO FLOAT.

QTY.	QTY.	QTY.	QTY.	ITEM NO.	PART OR IDENTIFYING NO.	DESCRIPTION OR NOMENCLATURE	MATERIAL	SPEC OR NOTE
						LIST OF MATERIAL OR PARTS LIST		
				00	1	A03271700-415A-4		
ASSY. OR ITEM		QTY. NEXT		NEXT ASSY.		MODEL NO.		
				APPLICATION				

ALL THREADS UNIFIED SERIES, EXTERNAL THREADS TO BE CLASS 2A; INTERNAL THREADS TO BE CLASS 2B, AFTER PLATING, UNLESS OTHERWISE SPECIFIED

FINISH ON ALL MACHINED SURFACES UNLESS OTHERWISE SPECIFIED.

REMOVE ALL BURRS AND SHARP EDGES UNLESS OTHERWISE SPECIFIED.

DO NOT SCALE DWG.

DIMENSIONS ARE IN INCHES AND INCLUDE PLATING THICKNESS UNLESS OTHERWISE SPECIFIED.

TOLERANCE UNLESS SPECIFIED		
BASIC	TWO PLACE	THREE PLACE
UP TO 6	± .02	±
6 TO 24	± .03	±
ABOVE 24	± .06	±
ANGULAR DIMENSION ±		

FINISH:

Sierra — LEAR SIEGLER, INC. SIERRA ELECTRONIC DIVISION, MENLO PARK, CALIFORNIA 94025

CODE IDENT. NO. 94668

FINAL ASSY

DATE 6/25/76 BY B. Carlson CHECKED 9/8/77 APPR

SIZE D | DRAWING NO. D03221100 | REV. C

SCALE 1/1 | STOCK AS | SHEET 1 OF 3

DWG NO. D03221100

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